Dell DR Series System Administrator Guide

Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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1

Introduction to the DR Series System

The DR Series system documentation contains topics that explain how to use the Dell DR Series system to perform data storage operations and manage storage and replication containers. The DR Series system topics introduce and describe the DR Series system graphical user interface (GUI) that you can use to manage your backup and replication operations. A comprehensive set of GUI-based procedures allow you to access all management features and capabilities using a supported web browser. If any important administrative task or operation is not supported from the DR Series system GUI, this guide provides and describes the corresponding command line interface (CLI) commands. For more information about the DR Series system CLI commands, see the *Dell DR Series System Command Line Reference Guide*.

About the DR Series System GUI Documentation

The DR Series system documentation describes how to use the graphical user interface (GUI) and its menus, tabs, and options to perform a wide variety of data storage operations, and to manage the related storage and replication containers.

The documentation is written for an administrator end-user and introduces and provides procedures for using the DR Series system GUI elements to easily manage your backup and deduplication operations. A comprehensive set of GUI-based procedures allow you to access all of the key management features and capabilities using a supported web-browser.

If any important administrative task or operation is not supported from the DR Series system GUI, the documentation provides and describes the corresponding DR Series system command line interface (CLI) commands.

NOTE: For information about the supported web browsers you can use with the DR Series system, see the *Dell DR Series System Interoperability Guide* available at **support.dell.com/manuals**.

Other Information You May Need

WARNING: See the safety and regulatory information that shipped with your system. Warranty information may be included within this document or as a separate document.

- The *Dell DR Series System Owner's Manual* provides information about solution features, describes how to troubleshoot the system, and how to install or replace DR Series system components. This document is available at **support.dell.com/manuals**.
- The *Dell DR Series System Command Line Reference Guide* provides information about managing DR Series system data backup and replication operations using the DR Series system command line interface (CLI). This document is available at **support.dell.com/manuals**.
- The *Dell DR Series System Getting Started Guide* provides an overview of setting up your DR Series system, and includes technical specifications. This document is available at **support.dell.com/manuals**.
- The *Setting Up Your Dell DR4100 System* provides information about network, initial setup, and user account settings needed to initialize the Dell DR4100 system. This document is available at **support.dell.com/manuals**
- The *Dell DR Series System Interoperability Guide* provides information on the supported hardware and software that can be used with the DR Series system. This document is available at **support.dell.com/manuals**.
- The *Dell PowerVault MD1200 and MD1220 Storage Enclosures Hardware Owner's Manual* provides information on the supported external data storage expansion shelf hardware (enclosures) that can be used with the DR Series system. This document is available at **support.dell.com/manuals**

- Any media that ships with your system that provides documentation and tools for configuring and managing your system, including those pertaining to the operating system, system management software, system updates, and system components that you purchased with your system.

NOTE: Always check for documentation updates on **support.dell.com/manuals** and read the documentation updates first because they often supersede information in other documents, and contain the latest updated versions of the documents.

NOTE: Always check for release notes on **support.dell.com/manuals** and read the release notes first because they contain the most recently documented information about known issues with a specific product release.

Source Code Availability

A portion of the DR Series system software may contain or consist of open source software, which you can use under the terms and conditions of the specific license under which the open source software is distributed.

Under certain open source software licenses, you are also entitled to obtain the corresponding source files. For more information about this or to find the corresponding source files for respective programs, see the Dell **opensource.dell.com** website.

2

Understanding the DR Series System

The DR Series system is a high-performance, disk-based backup and recovery appliance that is simple to deploy and manage, and offers unsurpassed Total Cost of Ownership benefits. Features such as innovative firmware and an all-inclusive licensing model ensure optimal functionality and the assurance of no hidden costs for desired future features.

NOTE: Unless otherwise noted, later references to "the system" or "DR Series system" are used interchangeably to represent the Dell DR Series system.

The DR Series system has a simple installation process with full, intuitive remote setup and management capabilities. It is available in the following drive capacities—2.7 Terabytes (TB), 5.4 TB, 9 TB, 18 TB, and 27 TB (the 27 TB drive capacity was added in Release 2.0), and is ideal for both small enterprise and remote office environments. The DR Series system and corresponding drive capacities are as follows:

- 300 Gigabyte (GB) drive capacity: 2.7 TB system (this system version does not support the addition of expansion shelf enclosures)
- 600 GB drive capacity: 5.4 TB system
- 1 TB drive capacity: 9 TB system
- 2 TB drive capacity: 18 TB system
- 3 TB drive capacity: 27 TB system

NOTE: To better understand the drive capacity and the available physical capacity for the drive types available in the DR Series system, see Drive and Available Physical Capacities.

NOTE: Release 2.0 also supports using an external data storage expansion shelf (also known as expansion enclosures). The DR Series system supports up to two expansion enclosures per system. An added expansion shelf enclosure must be equal to or greater than each DR Series system internal drive slot capacity (0–11). For more information about expansion enclosures, see Installing an Expansion Shelf License, DR Series System - Expansion Shelf Cabling, and Expansion Shelf Licenses.

NOTE: The 300 Gigabyte (GB) drive capacity (2.7 TB) version of the DR Series system does not support the addition of expansion shelf enclosures.

Using Dell deduplication and compression algorithm technology, this system can achieve data reduction levels ranging from 10:1 to 50:1. This reduction in data results in less incremental storage needs and a smaller backup footprint. By removing redundant data, the system provides deduplication and compression that delivers:

- Fast, reliable backup and restore functionality
- Reduces media usage and power and cooling requirements
- Improves overall data protection and retention costs

The benefits of data deduplication can be extended across the enterprise—through the deduplicated replication function—to provide a complete backup solution for multi-site environments.

The shorter Recovery Time Objectives (RTO) and more attainable Recovery Point Objectives (RPO) can also be assured as critical backup data remains on disk and online longer. Capital and administrative costs are diminished at the same time as internal service level agreements (SLAs) are more easily met.

The DR Series system includes the following:

- Advanced data protection and disaster recovery

- Simple management interface (using the system GUI)
- Wide variety of data backup installations and environments

The Dell DR Series system contains data backup and management software preinstalled on a Dell hardware appliance, which provides you with a robust disk-based data backup capability installed on a deduplication-enabled appliance.

The system supports two interface types, and the system software manages the storage containers using the following interfaces:

- A command line interface (CLI)
- A graphical user interface (GUI)

About the DR Series System

The Dell DR Series system is a solution designed to reduce your backup data footprint using a number of comprehensive backup and deduplication operations that optimize storage savings. Collectively, the DR Series system comes in two types:

- DR4000 system: this is preinstalled DR4000 system software on a Dell R510 appliance platform
- DR4100 system: this is preinstalled DR4000 system software on a Dell R720xd appliance platform

The DR Series system consists of the following components:

- Software—the system software supports record linkage and context-based lossless data compression methods.
- Hardware—there are two appliance types that support the DR Series:
  - DR4000 system: includes twelve 3.5-inch SAS or Nearline SAS chassis drives that are hot-swappable, two power supplies for power redundancy, and two cabled 2.5-inch SAS drives for the operating system. The operating system is installed on two 2.5–inch internal drives that are in a RAID 1 configuration in the DR4000 system.
  - DR4100 system: includes twelve 3.5-inch SAS or Nearline SAS chassis drives that are hot-swappable, two power supplies for power redundancy, and includes two 2.5-inch drives that are hot-pluggable in the rear.

  NOTE: For slot locations for the twelve 3.5–inch drives in the DR Series system types, see DR Series System and Data Operations.
- Expansion shelf—the system appliance supports the addition of up to two external Dell PowerVault MD1200 data storage expansion shelf enclosures. Adding an expansion shelf provides additional data storage for the DR Series system and also requires a license. Each added expansion shelf enclosure must be equal to or greater than each DR Series system internal drive slot capacity (0–11).

  NOTE: The 300 Gigabyte (GB) drive capacity (2.7 TB) version of the DR Series system does not support the addition of expansion shelf enclosures.

  For more information, see Expansion Shelf Licenses. For more general information about the supported storage enclosures, see "DR Series Expansion Shelf" in DR Series System and Data Operations, and **support.dell.com/manuals**.

Drive and Available Physical Capacities

Table 1 defines the internal system drive capacity and available physical capacity (in decimal and binary values) in the Release 1.0.1.2 and later releases of DR4000 system. Starting with the 2.0 release, the DR Series system comes in two types:

- DR4000 system—which consists of preinstalled DR4000 system software on an modified Dell R510 appliance platform.

- DR4100 system—which consists of preinstalled DR4000 system software on an modified Dell R720xd appliance platform.

Internal Drive Capacity

The capacity values listed in Table 1 represent the internal drive and available physical capacities that have been adjusted for the associated overhead in the DR4000/DR4100 system releases.

NOTE: In Table 1, the abbreviations TB and GB represents Terabytes and Gigabytes in decimal values, and the abbreviation TiB represents Tebibytes in binary values. Tebibytes are a standards-based binary multiple of the byte, a unit of digital information storage.

Table 1. Internal Drive Capacity and Available Physical Capacity

DR Series System Drive Capacity	Available Physical Capacity (Decimal)	Available Physical Capacity (Binary)
3 TB (DR4100 system only)	26.79 TB	23.8 TiB
2 TB	17.9 TB	15.9 TiB
1 TB	8.89 TB	7.9 TiB
600 GB	5.29 TB	4.6 TiB
300 GB	2.47 TB	2.2 TiB

For more general information about the external data storage capacity supported by the expansion shelf enclosures, see the "DR Series Expansion Shelf" section in DR Series System and Data Operations.

External Drive Capacity

The capacity values listed in Table 2 represent the additional storage capacity in the external drives that are available when you add the supported expansion shelf enclosures to a DR4000 or DR4100 system. Additional data storage can be added using the expansion shelf enclosures in 1 Terabyte (TB), 2 TB, or 3 TB capacities. For more information on the expansion shelf enclosures, see Adding a DR Series System Expansion Shelf, Installing an Expansion Shelf License, and DR Series System - Expansion Shelf Cabling.

Table 2. External Drive Capacity and Available Physical Capacity

DR Series System Drive Capacity	Available Physical Capacity (Decimal)	Available Physical Capacity (Binary)
1 TB	8.89 TB	7.9 TiB
2 TB	17.89 TB	15.9 TiB
3 TB	26.79 TB	23.8 TiB

Data Storage Terminology and Concepts

This topic presents several key data storage terms and concepts that help you to better understand the role that the DR Series system plays in meeting your data storage needs.

Data Deduplication and Compression: The DR Series system design draws upon a wide variety of data-reduction technologies that include the use of advanced deduplication algorithms, in addition to the use of generic and custom compression solutions that are effective across a large number of differing file types. The system uses a concept of content-awareness where it analyzes data to better learn and understand the structure of your files and data types. Once this is learned, it uses this method to improve your data reduction ratios while reducing resource consumption on the host. The system uses block deduplication to address the increasing data growth, and this is well suited to providing

the best results for routine and repeated data backups of structured data. Block-level deduplication works efficiently where there are multiple duplicate versions of the same file. This is because it looks at the actual sequence of the data–the 0s and 1s–that comprise the data.

Whenever a document is repeatedly backed up, the 0s and 1s stay the same because the file is simply being duplicated. The similarities between two files can be easily identified using block deduplication because the sequence of their 0s and 1s remain exactly the same. In contrast to this, there are differences in online data. Online data has few exact duplicates. Instead, online data files include files that may contain a lot of similarities between each file. For example, a majority of files that contribute to increased data storage requirements come pre-compressed by their native applications, such as:

- Images and video (such as the JPEG, MPEG, TIFF, GIF, PNG formats)
- Compound documents (such as .zip files, email, HTML, web pages, and PDFs)
- Microsoft Office application documents (including PowerPoint, MS-Word, Excel, and SharePoint)

  NOTE: The DR Series system experiences a reduced savings rate when the data it ingests is already compression-enabled by the native data source. It is highly recommended that you disable data compression used by the data source, and especially for first-time backups. For optimal savings, the native data sources need to send data to the DR Series system in a raw state for ingestion.

Block deduplication is not as effective on existing compressed files due to the nature of file compression because its 0s and 1s change from the original format. Data deduplication is a specialized form of data compression that eliminates a lot of redundant data. The compression technique improves storage utilization, and it can be used in network data transfers to reduce the number of bytes that must be sent across a link. Using deduplication, unique chunks of data, or byte patterns, can be identified and stored during analysis. As the analysis continues, other chunks are compared to the stored copy and when a match occurs, the redundant chunk is replaced with a small reference that points to its stored chunk. This reduces the amount of data that must be stored or transferred, which contributes to network savings. Network savings are achieved by the process of replicating data that has already undergone deduplication.

By contrast, standard file compression tools identify short repeated substrings inside individual files, with the intent of storage-based data deduplication being to inspect large volumes of data and identify large amounts of data such as entire files or large sections of files that are identical. Once this has been done, this process allows for the system to store only one copy of the specific data. This copy will be additionally compressed using single-file compression techniques. For example, there may be cases where an email system may contain 100 or more emails where the same 1 Megabyte (MB) file is sent as an attachment and the following shows how this is handled:

- Without data deduplication, each time that email system is backed up, all 100 instances of the same attachment are saved, which requires 100 MB of storage space.
- With data deduplication, only one instance of the attachment is actually stored (all subsequent instances are referenced back to the one saved copy), with the deduplication ratio being approximately 100 to 1). The unique chunks of data that represent the attachment are deduplicated at the block chunking level.

  NOTE: The DR Series system does not support deduplication of any encrypted data, so, there will be no deduplication savings derived from ingesting encrypted data. The DR Series system cannot deduplicate data that has already been encrypted because it considers that data to be unique, and as a result, cannot deduplicate it.

In cases where self encrypting drives (SEDs) are used, when data is read by the backup application, it is decrypted by the SED or the encryption layer. This works in the same way as if you were opening an MS-Word document that was saved on a SED. This means that any data stored on a SED can be read and deduplicated. If you enable encryption in the backup software, you will lose deduplication savings because each time the data is encrypted, the DR Series system considers it to be unique.

Replication: Replication is the process by which the same key data is saved from multiple storage devices, with the goal of maintaining consistency between redundant resources in data storage environments. Data replication improves the level of fault-tolerance, which improves the reliability of maintaining saved data, and permits accessibility to the same stored data. The DR Series system uses an active form of replication that lets you configure a primary-backup scheme.

During replication, the system processes data storage requests from a specified source to a specified destination (also known as a target) that acts as a replica of the original source data.

NOTE: Starting with Release 2.0, the DR Series system software includes version checking that limits replication only between other DR Series systems that run the same system software release version (DR Series systems running Release 2.0.x software can only replicate with other DR Series systems that run the same release system software). For example, Release 2.0.x systems will not be able to replicate with Release 2.1 or Release 3.0 systems, but can replicate with systems running Release 2.0.0.1 or 2.0.0.2.

NOTE: It is important to distinguish the difference between data that has been processed by backup and data that has been processed by replication, since backup saves a copy of data that remains unchanged for a long period of time.

Targets with replica data are read-only, and are updated with new or unique data during scheduled or manual replications. The DR Series system can be considered to act as a form of the storage replication where the backed up and deduplicated data is replicated in real-time or via a scheduled window. In a replication relationship between two DR Series systems, this means that a relationship exists between a pair of systems, one acting as the source and the other as a target in the replication pair (for example, with acme-west and acme-east). When this type of replication relationship exists between distinct containers on two distinct DR Series systems, it can be considered bidirectional in the sense that:

- West1 container on the acme-west source system can replicate data to a separate East1 container on the acme-east target system.
- The East2 container on the target acme-east system can also replicate data back to the West2 container on the source acme-west system.

This form of replication involves separate containers on two distinct DR Series systems. Target containers in replication must always act as read-only, while source containers can act as read-write. Unlike NFS and CIFS containers, OST container replication is handled by the two supported Data Management Applications (DMAs) on media servers. For details, see Understanding OST.

This release of the DR Series system supports the 32:1 replication of data, whereby up to 32 source DR Series systems can write data to different individual containers on a single, target DR Series system. This supports the use case where branch or regional offices can each write their own data to a separate, distinct container on a main corporate DR Series system.

NOTE: Be aware that the storage capacity of the target DR Series system is directly affected by the number of source systems writing to its containers, and by the amount being written by each of the source systems.

If the source and target systems in a replication pair reside in different Active Directory (AD) domains, then the data that resides on the target DR Series system may not be accessible. When AD is used for authentication for DR Series systems, the AD information is saved with the file. This can serve to restrict user access to the data based on the type of AD permissions that are in place.

NOTE: This same authentication information is replicated to the target DR Series system when you have replication configured. To prevent domain access issues, ensure that both the target and source systems reside in the same Active Directory domain.

Reverse Replication: The concept of reverse replication is not supported on DR Series systems. This is because replica containers are always in a R-O (read-only) mode on the DR Series system, thus making write operations a non-supported operation. Under very specific conditions, it might be possible for replica containers to support a type of write operation whose sole function is to restore data from an archival target. For example, data could be replicated back to the remote site where a data management application (DMA), also known as backup software, is connected to allow this data to be restored directly.

This specific case applies only to configurations where data is backed up from a remote location to a local container, and then replicated over a WAN to a replica container that is backed up to tape. The data needs to be restored from the

tape backup to the original location; first, restore the data back to a DR Series system replica container, and then restore it back to the original source location of the data on the other side of the WAN link.

NOTE: If you choose to use this alternate workaround method, you must set up a new data storage unit in the DMA and import the images before a restore to the original location can occur.

To support this effort to leverage deduplication across the WAN to allow this scenario, complete the following:

1. Make sure that the replication operation has completed (between source and target).
2. Delete current replication relationship, and re-create replication relationship (reversing the source and target roles).
3. Restore data to the original source container (now the target).
4. Make sure that the replication operation has completed.
5. Delete replication relationship and re-create replication relationship (restoring original source and target destinations).

Under this scenario, a fraction of the data to be recovered is sent across the WAN link. This could speed up a remote restore significantly. However, there are some downsides to this type of scenario:

- If step 1 is not followed correctly, any changes not fully replicated are lost.
- During steps 2 and 3, any data that is written to the original DR Series system source container may be lost.
- During step 4, if the data is not fully replicated back before the switch is made, it may be lost.

Alternatively, you still could support this effort by completing the following:

1. Create a new container on the target DR Series system.
2. Set up replication from this container back to the source DR Series system container.
3. Set up a new disk storage unit in the DMA and make sure that the DMA is aware of any new images.
4. Import the old images back into the DMA from the target DR Series system (the original source location).
5. Use a new disk storage unit in the DMA, and then restore the data back to the original client.

Data Deduplication and Compression

The DR Series system design uses a variety of data-reduction technologies, including advanced deduplication algorithms, in addition to the generic and custom compression solutions that prove effective across a large number of differing file types. Data deduplication and compression is addressed in the following areas:

- **DR4000/DR4100**: these DR Series system backup and recovery appliances provide both efficient and high-performance disk-based data protection to leverage the advanced deduplication and compression capabilities in the DR Series system software. Based on technology that is now part of the Dell Fluid Data Architecture, the DR Series systems provide a key component that performs backup, recovery, and data protection operations.
- **Deduplication**: this technology eliminates redundant copies of data and in the process it decreases disk capacity requirements and reduces the bandwidth needed for data transfer. Deduplication can be a major asset for companies that are dealing with increasing data volumes and require a means for optimizing their data protection.
- **Compression**: this technology reduces the size of data that needs to be stored, protected, and transmitted. Compression helps companies improve their backup and recovery times while helping reduce infrastructure and network resource constraints.

In general, DR Series systems (DR4000 and DR4100) are disk-based data protection appliances that offer advanced deduplication and compression capabilities to reduce the time and cost associated with backing up and restoring data. Based on deduplication and compression technology, the DR Series systems eliminate the need to maintain multiple copies of the same data. This lets customers keep more data online longer and reduce the need for tape backup dependency.

Using its deduplication and compression technology, DR Series systems can help achieve an expected data reduction ratio of 15:1. Achieving this reduction in data means that you need fewer incremental storage operations to run and it provides you with a smaller backup footprint. By removing redundant data, DR Series systems deliver fast reliable backup and restore functionality, reduce media usage and power and cooling requirements, and improve your overall data protection and retention costs.

You can extend the benefits of data deduplication across the enterprise as well–using the DR Series system deduplication replication function–to provide a complete backup solution for multi-site environments. With 32:1 deduplicated replication, up to 32 nodes can be replicated simultaneously to separate, individual containers on one node. The DR Series systems use compression with replication to shrink the data that is needed to be moved across the wire to a container.

Replication can be scheduled based on your settings to occur during non-peak periods. The replication schedule you create can be set and prioritized to ingest data over replication data to ensure the most optimal back up windows based on your needs. The DR Series systems are Symantec OpenStorage Technology (OST) certified to provide tight integration with its NetBackup and Backup Exec DMA products to allow them to control when backup images are created, compressed, duplicated, and deleted, so that customers using these products can leverage the DR Series system appliance as a disk.

The DR Series systems also provide seamless integration with a number of data management applications (DMA), including CommVault replicated disk libraries, IBM Tivoli Storage Manager (TSM), EMC Networker, ARCserve, and Veeam backup software applications. Ideal for both small-sized and medium-sized companies as well as remote offices, the DR Series system provides data deduplication and compression support for four data capacity points: 35 Terabytes (TB), 70 TB, 130 TB, or 270 TB.

NOTE: For a complete list of supported DMAs in the 2.0 release of the DR Series system, see the *Dell DR Series System Interoperability Guide* for details.

NOTE: The DR Series system does not support deduplication of any encrypted data. So, there will be no deduplication savings derived from ingesting encrypted data. The DR Series system cannot deduplicate data that has already been encrypted because it considers that data to be unique, and as a result, it cannot deduplicate it.

Replication

Replication is the process by which the same key data is saved from multiple storage locations, with the goal being to maintain its consistency between redundant resources in data storage environments. Data replication improves the level of fault-tolerance, which improves the reliability of maintaining saved data, and permits accessibility to the same stored data. The DR Series system uses an active form of replication that lets you configure a primary-backup scheme. During replication, the system processes data storage requests from a specified source to a specified destination (also known as a target) that acts as a replica of the original source data.

NOTE: Starting with Release 2.0, the DR Series system software includes version checking that limits replication only between other DR Series systems that run the same system software release version (DR Series systems running Release 2.0.x software can only replicate with other DR Series systems that run the same release system software). For example, Release 2.0.x systems will not be able to replicate with Release 2.1 or Release 3.0 systems, but can replicate with systems running Release 2.0.0.1 or 2.0.0.2.

NOTE: It is important to distinguish the difference between data that has been processed by backup, and data that has been processed by replication. This is because backup saves a copy of data that generally remains unchanged for a long period of time.

Targets with replication data are read-only, and are updated with new or unique data during scheduled or manual replications. The DR Series system can be considered to act as a form of a storage replication process in which the backup and deduplication data is replicated in real-time or via a scheduled window in a network environment. In a replication relationship between two DR Series systems, this means that a relationship exists between a pair of systems.

One system acts as the source and the other as a target in this replication pair (for example, acme-west and acme-east). When this type of relationship exists between distinct containers on two distinct DR Series systems, it can be considered bidirectional in the sense that:

- The West1 container on the acme-west source system can replicate data to a separate East1 container on the acme-east target system.
- The East2 container on the target acme-east system can also replicate data back to the West2 container on the source acme-west system.

This form of replication involves separate containers on two distinct DR Series systems. Target containers in replication must always act as read-only, while sources containers can act as read-write. Unlike NFS and CIFS containers, OST container replication is handled by the supported Data Management Applications (DMAs) on the corresponding media servers. For details, see Understanding OST.

The DR Series system supports the 32:1 replication of data, whereby up to 32 source DR Series systems can write data to different individual containers on a single, target DR Series system. This supports the use case where branch or regional offices can each write their own data to a separate, distinct container on a main corporate DR Series system.

NOTE: Be aware that the storage capacity of the target DR Series system is directly affected by the number of source systems writing to its containers, and by the amount being written by each of the source systems.

However, if the source and target systems in a replication pair are in different Active Directory (AD) domains, then the data that resides on the target system may not be accessible. When AD is used to perform authentication for DR Series systems, the AD information is saved with the file. This can act to restrict user access to the data based on the type of AD permissions that are in place.

NOTE: This same authentication information is replicated to the target DR Series system when you have replication configured. To prevent domain access issues, ensure that both the target and source systems reside in the same Active Directory domain.

Reverse Replication

The concept of reverse replication is not a supported operation on DR Series systems. This is because replica containers are always in a R-O (read-only) mode on the DR Series system, thus making write operations a non-supported operation.

Under very specific conditions, it might be possible for replica containers to support a type of write operation whose sole function is to restore data from an archival target. For example, data could be replicated back to the remote site where a data management application (DMA), or backup software, is connected to allow this data to be restored directly.

This specific type of case applies only to configurations where data is backed up from a remote location to a local container, and then replicated over a WAN to a replica container that is backed up to tape. The data needs to be restored from the tape backup to the original location; first back to a DR Series system replica container, and then back to the original source location of the data on the other side of the WAN link.

NOTE: If you choose to use this alternate workaround method, you must set up a new data storage unit in the DMA, and import the images before a restore to the original location can occur.

To leverage this type of deduplication across the WAN, complete the following:

1. Make sure that the replication operation has completed (between source and target).
2. Delete the current replication relationship, and re-create a replication relationship (reversing the source and target roles).
3. Restore data to the original source container (now the target).
4. Make sure that the replication operation has completed.

5. Delete the replication relationship and re-create a replication relationship (restoring original source and target destinations).

Under this scenario, a fraction of the data to be recovered is sent across the WAN link. This could speed up a remote restore significantly. However, there are some downsides to this type of scenario:

- If step 1 is not followed correctly, any changes not fully replicated are lost.
- During steps 2 and 3, any data that is written to the original DR Series system source container may be lost.
- During step 4, if the data is not fully replicated back before the switch is made, it may be lost.

Alternatively, you could still support this type of effort by completing the following:

1. Create a new container on the target DR Series system.
2. Set up replication from this container back to the source DR Series system container.
3. Set up a new disk storage unit in the DMA and make sure that the DMA is aware of any new images.
4. Import the old images back into the DMA from the target DR Series system (the original source location).
5. Use a new disk storage unit in the DMA, and then restore the data back to the original client.

Reverse Replication: Alternate Method

To support an alternate method of reverse replication, complete the following:

1. Create a new container on the target DR Series system.
2. Set up replication from this container back to the source DR Series system container.
3. Set up a new disk storage unit in the DMA and make sure that the DMA is aware of any new images.
4. Import the old images back into the DMA from the target DR Series system (the original source location).
5. Use a new disk storage unit in the DMA, and then restore the data back to the original client.

Supported File System Protocols

The DR Series system supports the following file system protocols:

- Network File System (NFS)
- Common Internet File System (CIFS)
- OpenStorage Technology (OST)

NOTE: The DR Series system supports three container connection types: NFS, CIFS, and OST. OST provides a logical disk interface that can be used with network storage devices to store data and support data storage operations.

For more information on OST, see Understanding OST, Creating an OST Connection Type Container, and Creating an NSF or CIFS Connection Type Container.

For more information on NFS and CIFS, see NFS, and CIFS.

NFS

The Network File System (NFS) is a file system protocol that is designated to be a file server standard, and its protocol uses the Remote Procedure Call (RPC) method of communication between computers. Clients can access files via the network similar to the way that local storage is accessed.

NFS is a client-server application in which a client can view, store, and update files on a remote system just like they are working on a local system. System or Network Administrators can mount all or a portion of a file system, and the file

system (or portion) that is mounted can be accessed using the privileges assigned to each file. The NFS protocol supports Unix, Macintosh, OpenVMS, and the Microsoft Windows operating systems.

CIFS

The Common Internet File System (CIFS) remote file access protocol is one supported by the DR Series system, and is also known as a Server Message Block (SMB). SMB occurs more commonly than the Network File System (NFS) protocol on systems that run the Microsoft Windows operating system. CIFS allows programs to request files or services on remote computers.

CIFS also uses the client-server programming model, whereby the client requests access to a file or passes a message to a program running on the server. Servers review all requested actions and return a response. CIFS is a public (or open) variation of the SMB that was originally developed and used by Microsoft.

NOTE: The DR Series system does not currently support the Server Message Block (SMB), version 2.0.

NOTE: For details on CIFS feature restrictions, see the *Dell DR Series System Interoperability Guide*, at **support.dell.com/manuals**.

CIFS ACL Support

Starting with the DR4000 system Release 1.1, the DR Series system software supports the use of access control lists (ACLs) for CIFS and share-level permissions. By definition, an ACL is simply a list of permissions that can be associated with any network resource.

Each ACL can contain access control entries (ACEs) that define or describe the permissions for an individual user or a group of users. An ACL can consist of zero (meaning that all users have access) or a number of ACEs that define specific permissions on a per-user or per-group basis.

NOTE: If an ACE list is empty (meaning that it contains zero entries), this means that all access requests will be granted.

An ACL describes the entities that are allowed to access a specific resource. ACLs are a built-in access control mechanism in the Windows operating systems. The ACL support in the DR Series system is differentiated by how it affects the following two container types:

- New containers
- Existing containers

NOTE: The DR Series system supports setting up share-level permissions for a CIFS share using a Microsoft Windows administrative tool. Share-level permissions let you control access to shares. For more information, see Configuring Share-Level Security.

NOTE: Any user that is part of BUILTIN\Administrators can edit ACLs on CIFS shares. The local DR Series system administrator is included in the BUILTIN\Administrators group. To add additional domain groups to the BUILTIN \Administrators group, you can use the Computer Manager tool on a Windows client to connect to the DR Series system as Domain administrator and add any groups you want. This capability allows users other than the Domain administrator to modify an ACL as needed.

Access Control List Support in Containers

All containers created with the 1.1 release and later versions of the DR4000 system software (or pre–1.1 version system software that was upgraded to 1.1 or later), applies a default Access Control List (ACL) at the root of the container. This

default ACL is the same as that which would be created by a Microsoft Windows 2003 Server. Therefore, these new containers with the default ACL support the following permission types:

NOTE: Any user that is part of BUILTIN\Administrators can edit ACLs on CIFS shares. The local DR Series system administrator is included in the BUILTIN\Administrators group. To add additional domain groups to the BUILTIN \Administrators group, you can use the Computer Manager tool on a Windows client to connect to the DR Series system as Domain administrator and add any groups you want. This capability allows users other than the Domain administrator to modify an ACL as needed.

- BUILTIN\Administrators:
  - Allows: full access, object inherit, and container inherit.
  - Applies to: this folder, subfolders, and files.
- CREATOR OWNER:
  - Allows: full access, inherit only, object inherit, and container inherit.
  - Applies to: subfolders and files only.
- EVERYONE:
  - Allows: traverse folders, execute files, list folders, read data, read attributes, and read extended attributes.
  - Applies to: this folder only.
- NT AUTHORITY\SYSTEM:
  - Allows: full access, object inherit, and container inherit.
  - Applies to: this folder, subfolders, and files.
- BUILTIN\Users:
  - Allows: create folders and append data, inherit-only, and container inherit.
  - Applies to: this folder, subfolders, and files.
- BUILTIN\Users:
  - Allows: read and execute, and container inherit.
  - Applies to: this folder, subfolders, and files.
- BUILTIN\Users:
  - Allows: create files and write data, object inherit, and container inherit.
  - Applies to: subfolders only.

NOTE: If these permissions are unsuitable for your needs, you can modify the default ACL to suit your own requirement using the Windows ACL Editor (for example, using **Properties** → **Security** from Windows Explorer).

NOTE: Beginning with the 1.1 release, the system does not understand the Owner Rights permission and sets the owner of new files/folders created by the Domain Administrators as DOM\Administrator rather than as BUILTIN \Administrators.

Existing Containers (Pre–1.1 Release)

Starting with Release 1.1, the DR Series system software supports the use of access control lists (ACLs) for CIFS and share-level permissions. An ACL is a list of permissions that can be associated with any resource. Each ACL can contain access control entries (ACEs) that define or describe the permissions for an individual user or a group of users. An ACL can consist of zero (all access) or a number of ACEs that define specific permissions on an per-user or per-group basis.

For any existing containers that were created prior to Release 1.1, all files are accessible to any user that logs in to the designated DR Series system. The associated ACL in these existing pre–1.1 release containers support only the following permissions:

- **Everyone**:
  - Allows: Full Access
  - Applies to: This folder, subfolders, and files
- **BUILTIN\Administrators**:
  - Allows: Full Access, Object Inherit, and Container Inherit
  - Applies to: This folder, subfolders, and files

However, you can also apply your own ACLs to existing containers if desired. You can do this by navigating to the root of the share for the designated container, and then flow an ACL down the directory tree. Be aware that the time required for this to complete is dependent upon the number of files and folders that reside in the container.

If you create local users, they will be added to BUILTIN\Users. Because the administrator account is a member of BUILTIN\Administrators, if you do experience any problems with ACLs on a container (for example, an ACL was applied that locks themselves or domain administrators out), you can connect via a client as MACHINE\Administrator.

At this point, you can edit the ACL (the BUILTIN\Administrators account has TakeOwnership privilege). Be aware that large ACLs can consume additional inodes on the container, which can cause problems if there are a large number of files and folders in the container. Small ACLs (with up to 10 ACEs) can reside in the spare space in the inode, while larger ones can consume an additional inode. Inodes functions as data structures on a Linux (or Unix-like operating system) filesystem where all the information about a file except its name and its actual data are stored.

NOTE: Dell recommends that administrators apply a set of permissions to existing containers that are similar to the way defaults are set for new containers. However, careful consideration needs to be given about granting access that addresses any specific security needs for individual users.

Unix Permissions Guidelines

For a user to create, delete, or rename a file or a directory requires Write access to the parent directory that contains these files. Only the owner of a file (or the root user) can change permissions.

Permissions are based on the user IDs (UIDs) for the file Owner and group IDs (GIDs) for the primary Group. Files have owner IDs and group owner IDs. To enable Unix access, the DR Series system supports three levels of users:

- Owner (of the file)
- Group (group in which the owner belongs)
- Other (other users with an account on the system)

Each of these three user types support the following access permissions:

- Read (read access that allows user to read files)
- Write (write access that allows user to create or write to a file)
- Execute (access that allows user to execute files or traverse directories in the filesystem)

NOTE: A root user has all levels of permission access, and a user can be a member of a single group or of multiple groups (up to 32 groups are allowed in Unix).

Windows Permissions Guidelines

To enable Windows access, the DR Series system supports access control lists (ACLs) that contain zero or more access control entries (ACEs), and an empty ACE list grants all access requests. The Windows New Technology File System

(NTFS) uses ACLs as part of the security descriptor (SD) process, which requires permissions to access such filesystem objects as files and directories. ACLs support two levels of users:

- Owners
- Groups

Both Owners and Groups have Security IDs (SIDs) that define and identify an object owner or the group owning an object. ACEs in an ACL consist of a SID, a specific permission that either allows or denies access and also defines which of the following inheritance settings apply:

- IO—inherit-only: not used for access checking.
- OI—object inherit: new files get this ACE added.
- CI—container inherit: new directories get this ACE added.

Windows NTFS ACLs include the following read, write, append, execute, and delete permissions that allow users to:

- Synchronize access
- Read data or list the directory
- Write data or add a file
- Append data or add a folder
- Read Extended Attributes (EAs)
- Write EAs
- Execute file or traverse folders
- Delete child or delete folders
- Delete a file

The Owner user type has two default permissions:

- Write discretionary ACL
- Read control

OpenStorage Technology (OST): DR Series System

OpenStorage Technology (OST), was developed by Symantec and provides a logical disk interface for use with network storage devices. The DR Series system appliance can use OST via plug-in software to integrate its data storage operations with a number of data management applications (DMAs).

OST allows for better coordination and integration between DR Series system backup, restore, and optimized duplication operations and the following supported DMA types:

- NetBackup
- Backup Exec

Integration is done via a Dell OST plug-in developed for the DR Series system, through which NetBackup and Backup Exec can control when the backup images are created, duplicated, and deleted. The major benefit of OST is that it allows the deduplication and compression operations to happen on the client-side so that network traffic can be reduced.

OST via the Dell OST plug-in allows NetBackup and Backup Exec to take full advantage of such DR Series system features as data deduplication, replication, and energy efficiency. DR Series systems can access the OpenStorage API code through the plug-in, which can be installed on the media server platform choice you make (Windows or Linux). The OST protocol allows the supported backup applications to communicate directly with the DR Series system and determine whether a specific chunk of data already exists on the system. This process means that if the data already

exists, only the pointers need to be updated on the DR Series system, and the duplicate chunk of data does not need to be transferred to the system. This process provides two benefits: it improves the overall backup speed, and also reduces the network load.

When OST is used with the DR Series system, it offers the following benefits:

- OST protocol provides faster and improved data transfers:
  - Focused on backups with minimal overhead
  - Accommodates larger data transfer sizes
  - Provides throughput that is significantly better than CIFS or NFS
- OST and DMA integration:
  - OpenStorage API enables the DMA-to-media server software communications
  - DR Series system storage capabilities can be used without extensive changes to DMAs
  - Backup and replication operations are simplified by using built-in DMA policies
- DR Series System and OST:
  - Control channel uses TCP port 10011
  - Data channel uses TCP port 11000
  - Optimized write operations enable client-side deduplication
- Replication operations between DR Series systems:
  - No configuration required on source or target DR Series systems
  - Replication is file-based, not container-based
  - Triggered by DMA optimized duplication operation
  - DR Series system transfers the data file (not the media server)
  - After duplication, DR Series system notifies DMA to update its catalog (acknowledging the second backup)
  - Supports different retention policies between source and replica

NOTE: This capability to use OST, also known as DR Rapid Data Access within Dell, adds tighter integration with backup software applications, such as the two Symantec OpenStorage-enabled backup applications supported in this release: NetBackup and Backup Exec.

OpenStorage Technology (OST) API

The OpenStorage Technology (OST) API is an application programming interface that allows disk-based devices like the DR Series system to natively integrate with the two supported Symantec Data Management Applications (DMA), NetBackup and Backup Exec. For example, because the DR Series system supports both data deduplication and replication, the OST API allows these supported DMAs to use the DR Series system appliance features and duplicate the optimized data from one storage appliance to another.

The OST API enables the writing of data to disk and is illustrated in the following example where NetBackup (the DMA) interacts with the DR Series system (the data backup and deduplication device) using the OST API:

- NetBackup needs to store a file to disk. To do this it notifies the DR Series system via the OST API which file it needs to backup and what to name this file.
- DR Series system accepts this file, backs it up, and stores it in its filesystem.
- NetBackup can perform one of three subsequent operations with this specific stored file:
  - Expire it
  - Restore from it

  - Copy or duplicate it
- If NetBackup, using the OST API, directs the DR Series system to expire a stored file, it deletes it from its filesystem.
- Similarly, if NetBackup, using the OST API, wants to restore from a stored file, it directs the DR Series system which file to restore, which then delivers the stored file to NetBackup for the restore.

NOTE: OST contains a feature called optimized duplication. For example, in optimized duplication, the DMA (NetBackup) directs device A to perform an optimized duplication with device B. Device A and B communicate and determine which data segments of the file need to be replicated from A to B for device B to ensure that device B contains a full and complete duplicate data file. Once successful, the DMA now knows about both copies of this data file, and can use this file on device B as it would any other data file that resides there.

Software Components and Operational Guidelines

To better coordinate and integrate OpenStorage Technology (OST) with the DR Series system data storage operations, the following guidelines list the supported software, required components, optimal performance, and supported operations:

- OST Media Server Component:
  - An OST server component resides on the DR Series system
  - For Linux media server installations, use the Linux OST plug-in and the Red Hat Package Manager (RPM) installer
  - For Windows media server installations, use the Windows OST plug-in and the Microsoft (MSI) installer
- Supported Windows-based OST plug-in releases:

  NOTE: The DR Series system supports both the 32–bit and 64–bit versions for NetBackup, and the 64–bit version for Backup Exec.

  - Windows 2003
  - Windows 2008
  - Windows 2008 Release 2
- Supported Linux-based 64-bit OST plug-in releases:
  - Red Hat Enterprise Linux (RHEL), version 5.x
  - RHEL, version 6.x
  - SUSE, version 10 and 11
- Supported Symantec OpenStorage (OST) protocol:
  - Symantec, version 9
  - Symantec, version 10
- Supported Symantec DMAs:
  - **NetBackup**: version 7.1 (Windows 2003, 32–bit), 7.1 (Windows 2008 R2, 64–bit), 7.5 (Windows 2008, 32–bit), 7.5 (Windows 2008 R2, 64–bit), 7.1 (RHEL 5.x, 64–bit), and 7.5(SLES11 SP2, 64–bit).
  - **Backup Exec**: version 2010 Release 3 (Windows 2008 R2, 64–bit), and 2012 (Windows 2008 R2, 64–bit).

    NOTE: The Dell DR Series system licensing is all-inclusive, so that no additional Dell licensing is required to use OST or the optimized duplication capability. The Dell OST plug-in that gets installed on a supported Linux or Windows media server platform is a free download from Dell. However, Symantec NetBackup requires that you purchase a Symantec OpenStorage Disk Option license. Similarly, Symantec Backup Exec requires that you purchase the Deduplication Option to enable the OST feature.
- Backup, restore, and optimized duplication operations need to be performed via the OST plug-in

- Optimal supported aggregated throughput rates:
  - 3 Terabytes per hour (TB/hr) for passthrough write operations
  - 4 TB/hr for optimized write operations

    NOTE: Passthrough writes are when data is sent from a media server to the DR Series system without applying any optimization to the data. By contrast, optimized writes are when data is sent from a media server to the DR Series system after optimization is applied to the data.
- Supported OST operations
  - Backup (Passthrough writes and Optimized writes)
  - Restore
  - Replication

NOTE: To check for the latest supported OST software components and operating guidelines, see the *Dell DR Series System Interoperability Guide*. This document is available at **support.dell.com/manuals**.

DR Series System and Data Operations

Data is stored and resides on the Dell DR Series system, a two-rack unit (RU) appliance, which comes preinstalled with the system software. Starting with the 2.0 release. the DR Series system comes in two types:

- DR4000 system: this consists of preinstalled DR4000 system software on a Dell R510 appliance platform.
- DR4100 system: this consists of preinstalled DR4000 system software on a Dell R720xd appliance platform.

The DR Series system consists of a total of 14 drives. Two of these drives are 2.5–inch drives that are configured as a Redundant Array of Independent Disks (RAID) 1 on the RAID Controller and this is considered to be volume 1. In the DR4000 system, these drives are internal, while in the DR4100 system, these drives are accessible from the rear. The data that is being backed up is stored on the 12 virtual disks that reside on the DR Series system appliance. This release also supported additional storage in the form of external expansion shelf enclosures (see the *DR Series Expansion Shelf* section in this topic). The hot-swappable data drives that are attached to the RAID controller are configured as:

- 11 drives that operate as RAID 6, which act as virtual-disks for data storage (drives 1–11).
- The remaining drive (drive 0) acts as the dedicated hot-spare drive for RAID 6 for the system.

The DR Series system supports RAID 6, which allows the appliance to continue read and write requests to the RAID array virtual disks even in the event of up to two concurrent disk failures, providing protection to your mission-critical data. In this way, the system design supports double-data drive failure survivability.

If the system detects that one of the 11 virtual drives has failed, then the dedicated hot spare (drive slot 0) becomes an active member of the RAID group. Data is then automatically copied to the hot spare as it acts as the replacement for the failed drive. The dedicated hot spare remains inactive until it is called upon to replaced a failed drive. This scenario is usually encountered when a faulty data drive is replaced. The hot spare can act as replacement for both internal mirrored drives and the RAID 6 drive arrays.

Figure 1. DR4000/DR4100 System Drive Slot Locations

Drive 0 (top)	Drive 3 (top)	Drive 6 (top)	Drive 9 (top)
Drive 1 (middle)	Drive 4 (middle)	Drive 7 (middle)	Drive 10 (middle)
Drive 2 (bottom)	Drive 5 (bottom)	Drive 8 (bottom)	Drive 11 (bottom)

DR Series Expansion Shelf

Each DR Series system appliance supports the installation and connection of up to two Dell PowerVault MD1200 data storage expansion shelf enclosures. Each expansion shelf contains 12 physical disks in an enclosure, which provides additional data storage capacity for the basic DR Series system. The supported data storage expansion shelves can be added in 1 Terabyte (TB), 2 TB, or 3 TB hard drive capacities.

The physical disks in each expansion shelf are required to be Dell-certified Serial Attached SCSI (SAS) drives, and the physical drives in the expansion shelf uses slots 1–11 configured as RAID 6, with slot 0 being a global hot spare (GHS). When being configured, the first expansion shelf is identified as Enclosure 1 (in the case where two enclosures are added, these would be Enclosure 1 and Enclosure 2). Adding an expansion shelf to support the DR Series system requires a license. For more information, see Expansion Shelf Licenses. For more general information about the supported storage enclosures, see **support.dell.com/manuals**.

NOTE: The 300 Gigabyte (GB) drive capacity (2.7 TB) version of the DR Series system does not support the addition of expansion shelf enclosures.

NOTE: If you are running a DR4000 system with an installed release of system software prior to 2.0, and you intend to upgrade to release 2.0 system software and install an external expansion shelf (or shelves), Dell recommends that you observe the following best practice sequence of operations to avoid any issues:

- Upgrade the DR4000 system with the release 2.0 system software
- Power off the DR4000 system (required for 2.0 with Dell OpenManage 7.1)
- Connect the external expansion shelf (or shelves) with cabling to the DR4000 system
- Power on the external expansion shelf (or shelves)
- Power on the DR4000 system

NOTE: If you install an expansion shelf enclosure to support a DR Series system, each shelf must use physical disks that have a capacity equal to or greater than each DR Series system internal drive slot capacity (0–11) that they are supporting.

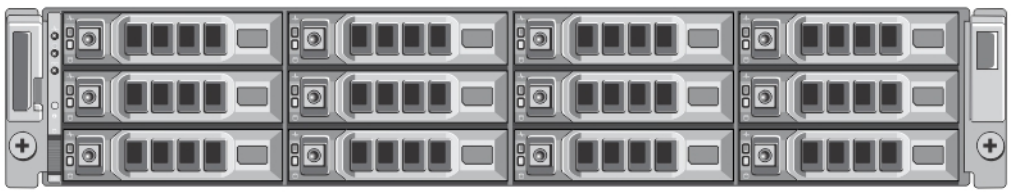


Figure 2. DR4100 System Expansion Shelf (MD1200) Drive Slot Locations

Drive 0 (top)	Drive 3 (top)	Drive 6 (top)	Drive 9 (top)
Drive 1 (middle)	Drive 4 (middle)	Drive 7 (middle)	Drive 10 (middle)
Drive 2 (bottom)	Drive 5 (bottom)	Drive 8 (bottom)	Drive 11 (bottom)

Understanding About Adding a DR Series Expansion Shelf

The 2.0 release of the DR Series system appliance allows you to connect up to two Dell PowerVault MD1200 data storage expansion shelf enclosures to provide additional data storage capacity beyond the capacity of the basic DR Series system. Supported data storage expansion shelves can be added in 1 Terabyte (TB), 2 TB, or 3 TB hard drive capacities. The process for adding an expansion shelf requires the following:

NOTE: The 300 Gigabyte (GB) drive capacity (2.7 TB) version of the DR Series system does not support the addition of expansion shelf enclosures.

- Physically adding or installing the expansion shelf (for more information, see Adding a DR Series System Expansion Shelf)
- Cabling the expansion shelf to the DR Series system (for more information, see DR Series System - Expansion Shelf Cabling)
- Installing the license for an expansion shelf (for more information, see Installing an Expansion Shelf License)

Supported Software and Hardware

For a complete list of the latest supported software and hardware for the DR Series system, Dell recommends that you see the *Dell DR Series System Interoperability Guide* at **support.dell.com/manuals**. For example, the *Dell DR Series System Interoperability Guide* lists the following supported hardware and software categories:

- Hardware
  - BIOS
  - RAID Controllers
  - Hard Drives (internal)
  - Hard Drives (external)
  - USB Flash Drives
  - Network Interface Controllers
  - iDRAC Enterprise
  - Marvell WAM Controller
- Software
  - Operating System
  - Supported Backup Software
  - Network File Protocols and Backup Client Operating Systems
  - Supported Web Browsers
  - Supported System Limits
  - Supported OST Software and Components

Terminal Emulation Applications

To access the DR Series system command line interface (CLI), the following terminal emulation applications can be used:

- FoxTerm
- Win32 console
- PuTTY

- Tera Term Pro

NOTE: The listed terminal emulation applications are not the only ones that will work with the DR Series system. This list is only intended to provide examples of terminal emulation applications that can be used.

DR Series — Expansion Shelf Cabling

The 2.0 release enables each DR Series system appliance that is capable of supporting additional storage capacity to install and connect up to two Dell PowerVault MD1200 data storage expansion shelf enclosures. Each of the expansion shelf enclosures contains 12 physical disks that provide additional data storage capacity for a basic DR Series system. The supported data storage expansion shelves can be added in 1 Terabyte (TB), 2 TB, or 3 TB hard drive capacities. Figures 1 and 2 are diagrams that display the recommended method for connecting the cabling between the DR4000/ DR4100 PERC controller card to the appropriate connectors on the rear of the Dell MD1200 expansion shelf enclosure.

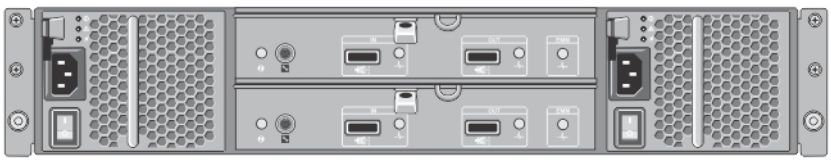
NOTE: The 300 Gigabyte (GB) drive capacity (2.7 TB) version of the DR Series system does not support the addition of expansion shelf enclosures.

Make sure that the Dell MD1200 front panel selector switch is set to its Unified mode (with the switch set to its "up" position, indicated by a single Volume icon). Figure 1 shows the SAS In ports on the Enclosure Management Module (EMM) on the rear of the Dell MD1200. Figure 2 shows the recommended redundant path cabling configuration, which includes cable connections from both PERC H800 connectors on the DR4000 system (or the PERC H810 on a DR4100 system) to the two SAS In ports on the EMM rear chassis of the MD1200.

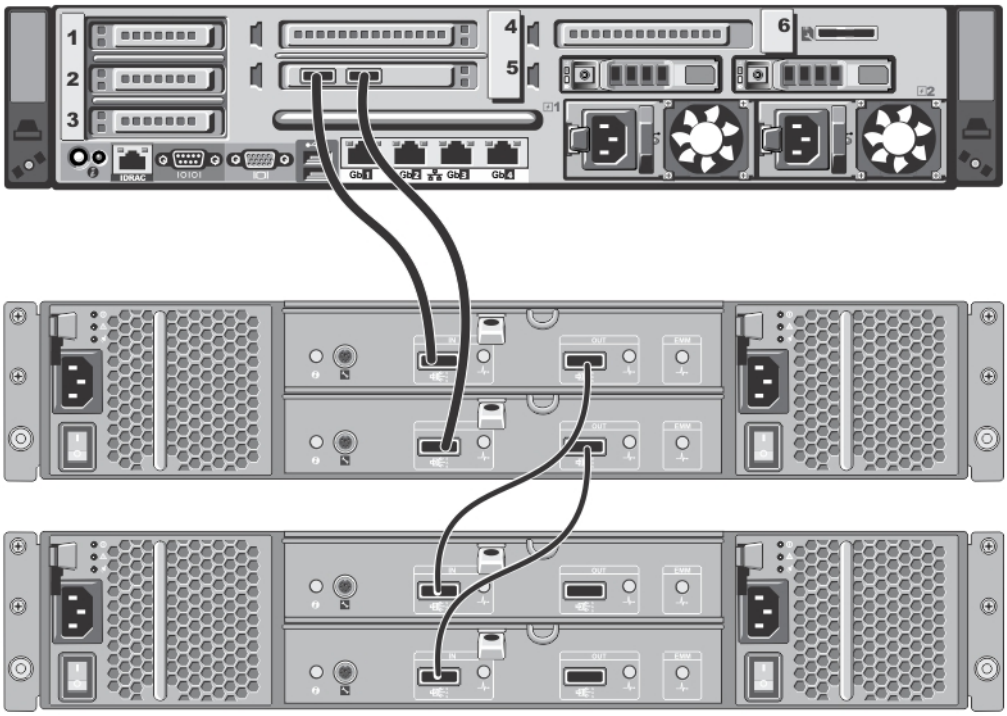
If you plan on installing the second of the two supported expansion shelf enclosures in Release 2.0, then the two SAS In ports on the rear chassis of the EMM on the second enclosure are daisy-chained to the two SAS Out ports on the EMM rear chassis on the first enclosure. This is considered a redundant mode connection via the SAS In/Out connectors on the enclosures with the DR Series system appliance (see Figures 1, 2, and 3 for more information).

If you install a second enclosure and cable it as described here, make sure to set the enclosure mode switch on the MD1200 front chassis to the top (unified mode) positions. For more information, see *Dell PowerVault MD1200 and MD1220 Storage Enclosures Hardware Owner's Manual* at **support.dell.com/manuals**.

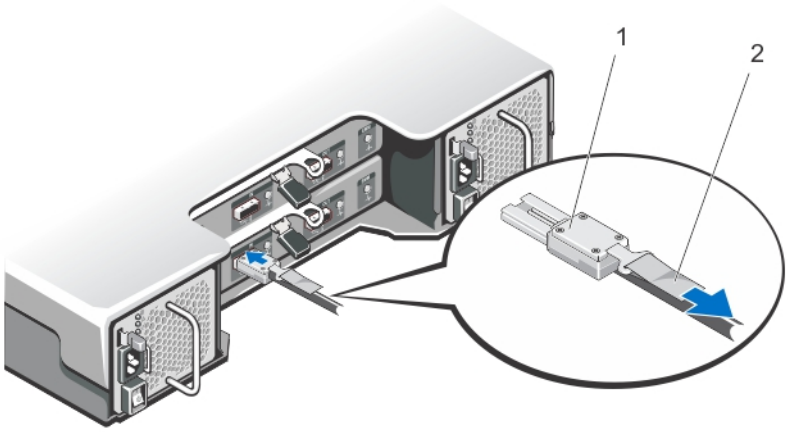
- **Figure 1, MD1200 Rear Chassis**



- **Figure 2, Unified Mode Daisy-Chained Redundant Path MD1200 Enclosures**



- **Figure 3, SAS Port and Cable Connections (MD1200 EMM)**



Adding a DR Series System Expansion Shelf

There are three tasks associated with configuring an expansion shelf enclosure with the DR Series system that you need to complete before being able to use this additional data storage capacity:

- Install all cabling that connects the expansion shelf enclosure to the DR Series system (for information, see DR Series System - Expansion Shelf Cabling).
- Add and activate the expansion shelf enclosure using the **Storage** page (which is explained in this topic).
- Install the Dell license for expansion shelf enclosures (for information, see Installing an Expansion Shelf License).

To add an expansion shelf enclosure to a DR Series system, complete the following:

1. Click **Storage** in the navigation panel.

   The **Storage** page is displayed (this step assumes that you completed all expansion shelf enclosure cable connections).

2. In the Physical Storage pane, click **Add** in the **Configured** column of the Physical Storage summary table that corresponds to the enclosure you want to add (*Not Configured* is the displayed **State** for the enclosure).

   The **Enclosure Addition** dialog is displayed that indicates that all input-output to the system will be stopped during an enclosure addition, and prompts you to click **OK** to continue or click **Cancel** to stop this process.

3. Click **OK** to continue adding the enclosure to the DR Series system.

   If you click **Cancel**, the addition process quits and the **Storage** page is displayed.

4. If you clicked **OK**, an **Enclosure Addition** dialog is displayed that indicates this process may take up to 10 minutes to complete.

   A **System Status** dialog displays with the following message: *The system is currently adding an enclosure. Please wait for this process to complete and the system to become operational.*

5. To verify that an enclosure was added, click **Dashboard**→ **Health**.

   The **Health** page is displayed, and each properly cabled and activated expansion shelf enclosure has a corresponding tab that displays a green status check mark (for example, if you have installed two enclosures, two tabs are displayed: **Enclosure 1** and **Enclosure 2**).

   NOTE: If the **Enclosure** tab does not display a green status check mark, this indicates that there is an issue with the enclosure (such as it has not been properly connected or activated).

6. After adding an expansion shelf enclosure, make sure that you install an expansion shelf license.

   For more information, see Installing an Expansion Shelf License.

3

Setting Up the DR Series System

Before you can interact with the DR Series system using one of its two supported methods: the web-based DR Series system graphical user interface (GUI) using a web browser or the command line interface (CLI) and a terminal emulator application (for example, PuTTY), you must first ensure that it is properly set it up. For more information about properly setting up the DR Series system, see the following links. For more information on the DR Series system CLI commands, see the *Dell DR Series System Command Line Reference Guide*.

Related Links

Logging in Using a Web Interface
Interacting with the DR Series System
Logging in and Initializing the DR Series System
Networking Preparations for the DR Series System

Interacting with the DR Series System

You interact with the DR Series system using its web-based graphical user interface (GUI) through a browser-based connection. The DR Series system GUI provides a single, comprehensive data management interface that lets you create new data containers, modify or delete existing containers, and perform a number of data-related operations using its features and settings.

NOTE: A second method for interacting with the DR Series system is by using its command-line interface (CLI) via a terminal emulator application (for example, PuTYY).

You can create and manage containers that are the repositories where you store your backup and deduplicated data. A data container is a shared file system that is imported using a client, and is accessible via NFS or CIFS filesystem protocols.

The DR Series system provides real-time summary tables, detail tables, and graphs that let you monitor the status of the data capacity, storage savings, and the throughput of the containers you are managing using its set of GUI features.

Networking Preparations for the DR Series System

Before you can start using the DR Series system, ensure that you have satisfied the following networking prerequisites:

- **Network:** An active network is available using Ethernet cables and connections.

  NOTE: If your DR Series system is equipped with a 1-GbE NIC, Dell recommends using CAT6 (or CAT6a) copper cabling. If your DR Series system is equipped with a 10-GbE NIC, Dell recommends using CAT6a copper cabling.

  NOTE: If your DR Series system is equipped with a 10-GbE enhanced small form-factor pluggable (SFP+) NIC, you must use Dell-supported SFP+ LC fiber-optic transceivers or twin-axial cabling.
- **IP Addresses:** You need to make sure to have IP addresses that you use for the DR Series system. The DR Series system ships with a default IP address and subnet mask address, which should only be used for an initial system configuration.

  NOTE: You need to have an IP address available to replace the default IP address if you choose the static mode of IP addressing, or select to use the DHCP mode of IP addressing.

To perform an initial configuration, you need:

  - An IP address for the system
  - A subnet mask address
  - A default gateway address
  - A DNS suffix address
  - A primary DNS server IP address
  - (Optional) A secondary DNS server IP address

- **NIC Connections:** To configure NIC connection bonding remember that, by default, the DR Series system will configure its NIC interfaces together as a bonded team (and only one IP address is needed because the bonded NICs assume the primary interface address). NIC connection bonding can use either of these configurations:

  - Adaptive load balancing (ALB), which is the default setting, does not require any special network switch support. Ensure that the data source system resides on the same subnet as the DR Series system. For more information, see Configuring Networking Settings.
  - 802.3ad or dynamic link aggregation (using the IEEE 802.3ad standard). 802.3ad requires special switch configuration before using the system (contact your network administrator for an 802.3ad configuration).

  NOTE: To configure a 10-GbE NIC or 10-GbE SFP+ bonded configuration, connect only the 10-GbE/10-GbE SFP+ NICs (1-GbE NICs are disabled when the 10-GbE/10-GbE SFP+ NICs are present).

- DNS: you need a DNS domain available, and you need to know the primary DNS server IP address (and a secondary DNS server IP address, if you choose to configure one).
- Replication ports: the replication service in the DR Series system requires that enabled fixed ports be configured to support replication operations that are to be performed across firewalls (TCP ports 9904, 9911, 9915, and 9916).

  For more information about replication ports, see Managing Replication Operations, and for more information about system ports, see Supported Ports in a DR Series System.

  NOTE: For the latest details about supported hardware and software for the Dell DR Series system, see the *Dell DR Series System Interoperability Guide* at **support.dell.com/manuals**.

  NOTE: For information about ports needed for OST operations, see Understanding OST.

Connections for Initializing a DR Series System

There are two supported methods for connecting to the DR Series system for logging in and performing the initial system configuration via the DR Series system CLI:

- **Local console connection**: this is a local access connection made between a local workstation and the DR Series system (with one connection made to a USB keyboard port on the DR Series front/rear chassis, and a second connection made to the VGA monitor port on the DR Series system rear chassis. (See Figure 1 for locations in the DR Series System Rear Chassis Port Locations in the Local Console Connection.)
- **iDRAC connection**: this is a remote access connection made between an integrated Dell Remote Access Controller (iDRAC) and the dedicated management port on the DR Series system rear chassis. (See Figure 1 for locations in the DR Series System Rear Chassis Port Locations in the Local Console Connection.)

Initializing the DR Series System

Before you can start using the DR Series system graphical user interface (GUI) for the first time, you must properly initialize the system. To initialize the DR Series system, complete the following:

1. Log in to the DR Series system CLI by using a local console KVM (keyboard-video monitor) connection or an iDRAC connection. For more information, see Local Console Connection, or iDRAC Connection.
2. Configure your system network settings using the **Initial System Configuration Wizard**. For more information, see Logging in and Initializing the DR Series System.

The **Initial System Configuration Wizard** lets you configure the following network settings to complete a first-time initialization of your system:

- IP addressing mode
- Subnet mask address
- Default gateway address
- DNS suffix address
- Primary DNS server IP address
- (Optional) Secondary DNS server IP address
- Host name for system

Default IP Address and Subnet Mask Address

This topic lists the following default address values that can be used for initialization of a DR Series system:

- IP address—10.77.88.99
- Subnet mask address—255.0.0.0

There are two key factors related to default address values and initializing a DR Series system:

- Using the local console
- Reserving MAC addresses using DHCP

If the network where the system will reside does not have or does not support DHCP, then the DR Series system can use the default IP (10.77.88.99) and subnet mask (255.0.0.0) addresses provided for initialization. If the network where the system will reside does not have or support reserving an IP address for the MAC address of the NICs in the DHCP server, then DHCP assigns an arbitrary IP address that is unknown (and which is unusable by you) during initialization.

As a result, if your network does not support DHCP or if you cannot reserve an IP address for the specific MAC addresses of the DHCP network interface cards (NICs), then Dell recommends that you use the local console connection method and the **Initial System Configuration Wizard**.

NOTE: After successfully initializing and configuring your system, you can modify the IP address to use either a static IP address or use dynamic IP addressing (DHCP), and modify the subnet mask address to be one that is supported by your network.

NOTE: If you have not run the **Initial System Configuration Wizard** on one (or more) DR Series system(s) being installed into the same network, there is a potential that the system (or systems) may come up with the same default IP address (10.77.88.99). The default IP address is not user-configurable and it can potentially result in becoming a duplicate IP address in the case of multiple systems.

Initialization issues could include when a network has had a network power outage, the DHCP server in the network is misconfigured, or if the **Initial System Configuration Wizard** has never been run.

If your network does not accept the default subnet mask address (255.0.0.0), you can establish a connection between the DR Series system and a laptop workstation. In this case, make sure that you connect using SSH, and use the default IP address to run the **Initial System Configuration Wizard**.

If you are using a known static IP address, you can skip running the **Initial System Configuration Wizard**, and directly configure the DR Series system using its user interface.

To configure the DR Series system, select **System Configuration** → **Networking** , and configure the network settings as desired. For more information, see Configuring Networking Settings.

NOTE: For details about logging in and using the **Initial System Configuration Wizard**, see Configuring Networking Settings.

Local Console Connection

To configure a local console connection, you must make the following two rear chassis cable connections:

- VGA port and your video monitor
- USB port and your keyboard

To make local console cable connections for the DR4000 and DR4100 system appliances, complete the following:

1. (**DR4000 system appliance**) Locate the VGA monitor port and the USB ports on the back of your system. See Figure 1 for the VGA and USB port locations and complete steps 1–4. For the DR4100 system appliance, skip to step 5.
2. Connect the video monitor to the VGA port on the back of your system (see item 1 in the DR4000 System Rear Chassis Port Locations table).
3. Connect the USB keyboard to one of the two USB ports on the back of your system (see item 3 in DR4000 System Rear Chassis Port Locations table).
4. You are now ready to perform initialization using the DR Series system CLI login process. For more information, see Logging in and Initializing the DR Series System.

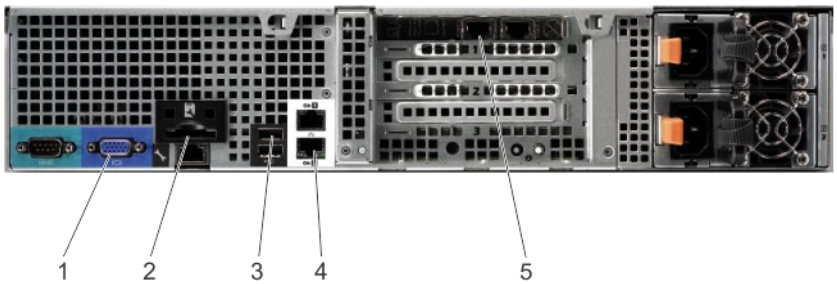


Figure 3. DR4000 System Rear Chassis Port Locations

Item	Indicator, Button, or Connector	Icon	Description
1	Video connector		Connects a VGA display to the system.
2	iDRAC6 Enterprise port		Dedicated management port for the iDRAC6 Enterprise card.
3	USB connectors (2)		Connects USB devices to the system. The ports are USB 2.0-compliant.
4	Ethernet connectors (2)		Embedded 10/100/1000 NIC connectors.
5	Ethernet Connectors (2) on expansion card		1-GbE/10-GbE/10-GbE SFP+ Ethernet Port

To make local console cable connections for the DR4100 system appliance, complete the following:

NOTE: The DR4000 system supports up to four 1–GbE ports or up to two 10–GbE ports; for the 1–GbE ports, these are two internal LAN on Motherboard (LOM) ports referenced in item 4 above that reside on the motherboard, and two ports on an expansion card referenced in item 5 above. If the DR4000 system is using the two 10–GbE ports, these reside on an expansion card referenced in item 5 above.

5. (**DR4100 system appliance**) Locate the VGA monitor port and the USB ports on the back of your system. See Figure 2 for the VGA and USB port locations and complete steps 5–8.

6. Connect the video monitor to the VGA port on the back of your system (see item 1 in the DR4100 System Rear Chassis Port Locations table).
7. Connect the USB keyboard to one of the two USB ports on the back of your system (see item 7 in the DR4100 System Rear Chassis Port Locations table).
8. You are now ready to perform initialization using the DR Series system CLI login process. For more information, see Logging in and Initializing the DR Series System.

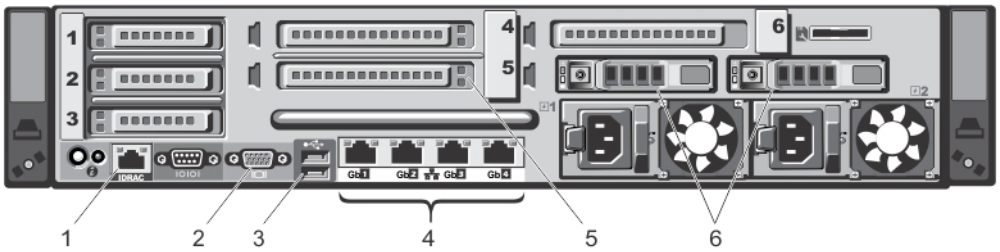


Figure 4. DR4100 System Rear Chassis Port Locations

Item	Indicator, Button, or Connector	Icon	Description
1	iDRAC7 Enterprise port		Dedicated management port for the iDRAC7 Enterprise card (port is available only if an iDRAC7 Enterprise license is installed on your system).
2	Video connector		Connects a VGA display to the system.
3	USB connectors (2)		Connects USB devices to the system. The ports are USB 2.0-compliant.
4	Ethernet connectors (4)		Four integrated 10/100/1000 NIC connectors, or four integrated connectors that include: – Two 10/100/1000 Mbps NIC connectors – Two 100 Mbps/1 Gbps/10 Gbps SFP+/10-GbE T connectors
5	PCIe expansion card slots (3)		Connect up to three full-height PCI Express expansion cards
6	Hard drives (2)		Provides two hot-swappable 2.5-inch hard drives

NOTE: The DR4100 system supports up to six 1–GbE ports or up to two 10–GbE ports. For the 1–GbE ports, these are four internal LAN on Motherboard (LOM) ports referenced in item 4 above that reside on the network daughter card (NDC), and two additional ports on a PCI Express expansion card referenced in item 5 above. If the DR4100 system is using the two 10–GbE ports, these ports reside on the NDC.

iDRAC Connection

The iDRAC connection requires a network connection between the integrated Dell Access Control (iDRAC) management port on the DR Series system and another computer running the iDRAC remote console session in a supported browser. The iDRAC provides remote console redirection, power control, and the out-of-band (OOB) system management functions for the DR Series system. iDRAC connections are configured using console redirection and the iDRAC6/7 web interface. The login values you can use for making iDRAC connections are:

- Default username: **root**
- Default password: **calvin**
- Default static IP address: **192.168.0.120**

For information on how to configure the iDRAC, see the Dell RACADM Reference Guides at **support.dell.com/manuals** and Accessing iDRAC6/iDRAC7 Using RACADM.

When the **Dell DR Series System** splash screen is displayed, you are ready to begin initialization using the DR Series system CLI login process. For more information, see Logging in and Initializing the DR Series System.

Logging in and Initializing the DR Series System

Use the DR Series system CLI and the **Initial System Configuration Wizard** to log in to and initialize the system. After completing a local console or iDRAC connection, log in to the DR Series system CLI:

1. Launch a terminal emulator application (like PuTTY), and type the default IP address for the DR Series system (if you are not using iDRAC or local console).
2. At the **login as:** prompt, type **administrator**, and press **<Enter>**.
3. At the **administrator@<system_name> password:** prompt, type the default administrator password (**St0r@ge!**), and press **<Enter>**.

   The **Initial System Configuration Wizard** window is displayed.

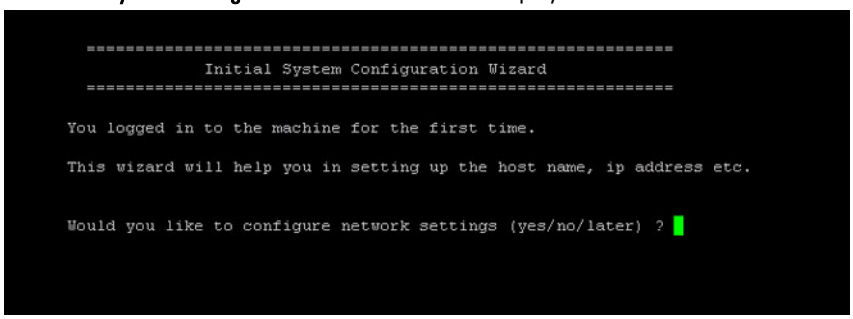

Initial System Configuration Wizard
You logged in to the machine for the first time.
This wizard will help you in setting up the host name, ip address etc.
Would you like to configure network settings (yes/no/later) ?

Figure 5. Initial System Configuration Wizard Window

4. To configure the network settings, type **y** (for yes), and press **<Enter>**.
5. To configure the use of the default IP address that ships with the system, choose to use static IP addressing.

   To do this, at the DHCP prompt, type **no** (this selects static IP addressing), and press **<Enter>**.

   NOTE: When you select static IP addressing, you are prompted to type the static IP address (for example, you could use the default IP, 10.77.88.99) for the system, and press **<Enter>**. If your network supports the use of DHCP, type **yes** at the DHCP prompt, press **<Enter>**, and respond to any prompts.
6. To configure a subnet mask address, type the subnet mask address you want to use (for example, you could use the default subnet mask address, 255.0.0.0), and press **<Enter>**.
7. To configure a default gateway address, type the default gateway address you want to use (for example, 10.10.20.10), and press **<Enter>**.
8. To configure a DNS Suffix, type the DNS suffix you want to use (for example, storage.local), and press **<Enter>**.
9. To configure a primary DNS server IP address, type an IP address you want to use for the primary DNS server (for example, 10.10.10.10), and press **<Enter>**.
10. (Optional) To configure a secondary DNS server IP address, type **y** (for yes), and press **<Enter>**.

    If you responded **yes**, type an IP address you want to use for the secondary DNS server (for example, 10.10.10.11), and press **<Enter>**.

11. To change the default host name (for example, the serial number of the DR Series hardware appliance), type **y** (for yes) and press **<Enter>**.

    If you responded **yes**, type the host name you want to use, and press **<Enter>**. If you did not want to change the default host name, type **n** (for no) and press **<Enter>**. After you configure your host name response, the current system settings are displayed.

12. To accept these settings, type **y** (for yes), and press **<Enter>**.

13. If you want to change any of these settings, type **n** (for no), and press **<Enter>**. Modify the settings as needed, and press **<Enter>**.

    When completed, a successful initialization message is displayed.

14. At the prompt, type **exit** and press **<Enter>** to end the DR Series system CLI session.

You are now ready to log in to the system using the DR Series system GUI.

NOTE: Before you log into the system using the DR Series system GUI, make sure to register it in the local Domain Name System (DNS) for your network so that it is a DNS-resolvable entry.

NOTE: At this point, you could modify the bonding mode to use 802.3ad, if this configuration is available in your network.

Accessing iDRAC6/iDRAC7 Using RACADM

You can use SSH-based or Telnet-based interfaces to access iDRAC6/iDRAC7 using the RACADM utility. RACADM (remote access controller administration) is a Dell command-line utility that allows you to set up and configure the integrated Dell Remote Access Control (iDRAC) interface card to provide an out-of-band management capability.

The iDRAC card contains a controller with its own processor, memory, network connection, and access to the system bus. This gives system or network administrators the capability to configure a system as if they were sitting at the local console using the power management, virtual medial access and remote console capabilities, by using a supported web browser or command line interface.

The login values you can use for making iDRAC connections are:

- Default username: **root**
- Default password: **calvin**
- Default static IP address: **192.168.0.120**

For more information, see the *RACADM Reference Guides for iDRAC*, the *Integrated Dell Remote Access Controller 6 (iDRAC6) User Guide*, or the *Integrated Dell Remote Access Controller 7 (iDRAC7) User Guide* that are available at **support.dell.com/manuals**.

Logging in Using a Web Interface

To log in to the DR Series system using a browser-based connection, complete the following:

NOTE: This procedure describes the logging in process from a first-time perspective, starting with the **Customer Registration and Notification** page, the completion of the **Initial System Configuration Wizard** process, and the **Initial Software Upgrade** page.

1. In a supported web browser, type the IP address or hostname of the system in the browser **Address bar**, and press **<Enter>**.

   The **DR Series System Login** page is displayed.

NOTE: The **DR Series System Login** page may display a warning message if the web browser you are using does not properly support the DR Series system. If you are running a Microsoft Internet Explorer (IE) 8 or greater web browser, make sure that you disable the **Compatibility View**. For more information about disabling the **Compatibility View** settings, see Disabling the Compatibility View Settings. For more information about the supported web browsers, see the *Dell DR Series System Interoperability Guide, Release 2.0.0.0*.

NOTE: For best results when using IE web browsers in combination with supported Windows-based servers, ensure that **Active Scripting** (JavaScript) is enabled on the Windows client. This setting is often disabled by default on Windows-based servers. For more information on enabling Active Scripting, see Enabling Active Scripting in Windows IE Browsers.

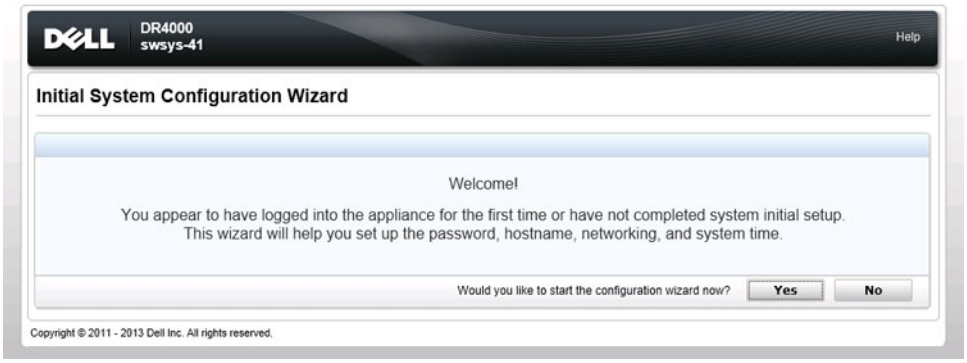
NOTE: If you want to reset your login password, click **Reset Password** on the **DR Series System Login** page. The **Reset Password** dialog is displayed. In **Service Tag**, enter the service tag number ID for the system, and click **Reset Password** to reset the system password back to its default setting (or click **Cancel** to return to the **DR Series System Login** page).

2. In **Password**, type **St0r@ge!** and click **Log in** or press **<Enter>**.

   The **Customer Registration and Notification** page is displayed. Before you can begin using the DR Series system graphical user interface (GUI), you need to properly register the system with Dell. In addition, this page also allows you to sign up for notifications about appliance alerts and system software updates. For more information, see Registering a DR Series System.

3. In the Settings pane of the **Customer Registration and Notification** page, complete the following:
   a) In **Contact Name**, enter a system contact name.
   b) In **Relay Host**, enter a hostname or IP address for the relay host.
   c) In **Email Address**, enter an email address for the contact.
   d) Select **Notify me of DR4000 appliance alerts** to be notified about system appliance alerts.
   e) Select **Notify me of DR4000 software updates** to be notified about system software updates.
   f) Select **Don't show me this again** to not display the **Customer Registration and Notification** page again.
   g) Click **Confirm** to have the DR Series system accept your settings (or click **Skip** without configuring any settings) to proceed with initialization.

   The **Initial System Configuration Wizard** page is displayed.


DR4000
swsys-41
Help
Initial System Configuration Wizard
Welcome!
You appear to have logged into the appliance for the first time or have not completed system initial setup.
This wizard will help you set up the password, hostname, networking, and system time.
Would you like to start the configuration wizard now?
Yes
No
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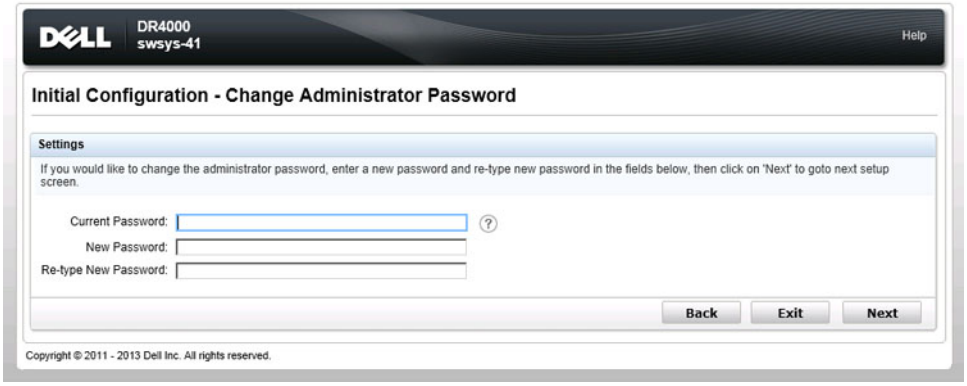
4. To start the initial system configuration process, click **Yes**.

   The **Initial Configuration — Change Administrator Password** page is displayed.

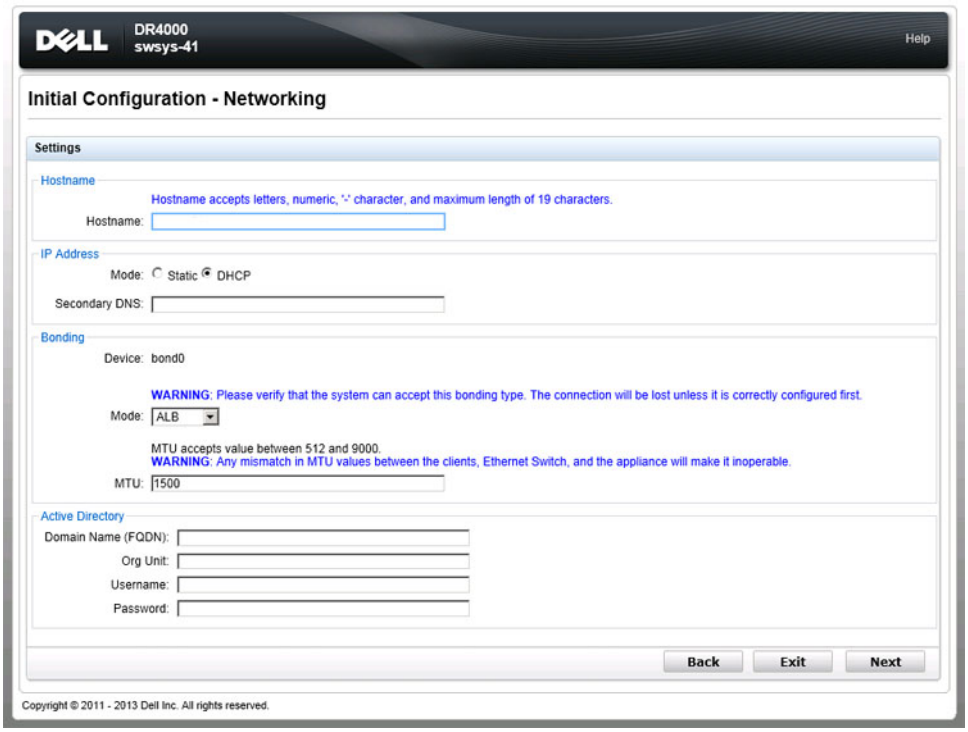
   NOTE: If you click **No**, you will bypass the initial system configuration process, and the DR Series system **Dashboard** page is displayed. However, when you next log in to the DR Series system, you will be prompted to perform the initial system configuration process again with the **Initial System Configuration Wizard** page being displayed.

   The **Initial Configuration — Change Administrator Password** page is displayed.


DR4000
swsys-41
Help
Initial Configuration - Change Administrator Password
Settings
If you would like to change the administrator password, enter a new password and re-type new password in the fields below, then click on 'Next' to goto next setup screen.
Current Password:
New Password:
Re-type New Password:
Back
Exit
Next
Copyright © 2011 - 2013 Dell Inc. All rights reserved.

5. In the Settings pane of the **Initial Configuration — Change Administrator Password** page, complete the following:
   a) In **Current Password**, enter the current administrator password.
   b) In **New Password**, enter the new administrator password.
   c) In **Retype New Password**, enter the new administrator password again to confirm it.
   d) Click **Next** to continue with the initial configuration process (or click **Back** to return to the previous page, or click **Exit** to close the **Initial System Configuration Wizard**).

   The **Initial Configuration — Networking** page is displayed.



6. In the Settings pane of the **Initial Configuration — Networking** page, complete the following:
   a) In **Hostname**, enter a hostname that meets the hostname naming convention: A-Z, a-z, 0–9, the dash special character (-), within a maximum 19 character limit.
   b) In **IP Address**, select the **Static** or **DHCP** mode of IP addressing, and if planning to use a **Secondary DNS**, enter an IP address for the secondary domain name system.
   c) In **Bonding**, select the **Mode** choice from the drop-down list (ALB or 802.3ad).

   Dell recommends that you verify the system can accept your bonding selection type. The connection will be lost unless it is correctly configured. For more information, see Configuring Networking Settings.

d) In **Bonding**, enter the **MTU** value for the maximum transmission unit (the MTU accepts values between 512 and 9000). For more information, see Configuring Networking Settings.

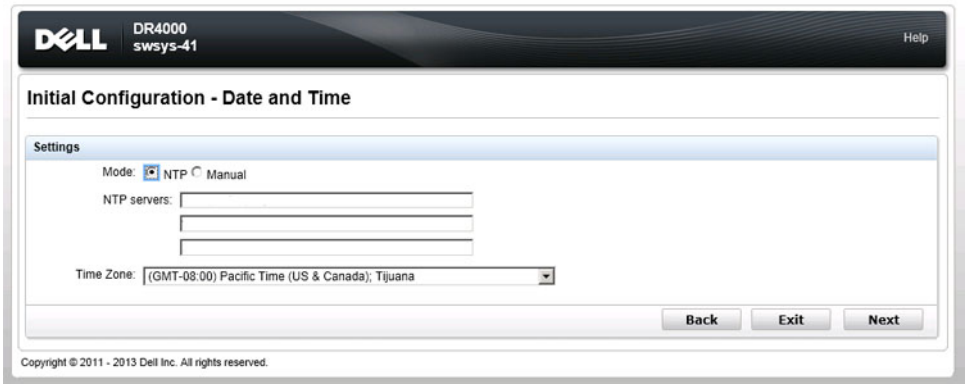
e) In **Active Directory**, enter a fully qualified domain name for the Active Directory Services (ADS) domain in **Domain Name (FQDN)**, enter an organization name in **Org Unit**, enter a valid ADS username in **Username**, and enter a valid ADS password in **Password**.

For more information, see Configuring Active Directory Settings.

NOTE: If an ADS domain has already been configured, you will not be allowed to change the values for the **Hostname** or **IP Address** settings.

f) Click **Next** to continue with the initial configuration process (or click **Back** to return to the previous page, or click **Exit** to close the **Initial System Configuration Wizard**).

The **Initial Configuration — Date and Time** page is displayed.



NOTE: If the Microsoft Active Directory Services (ADS) domain has already been configured, the **Initial Configuration — Date and Time** page will not display.

7. In the Settings pane, select the **Mode** choice (**NTP** or **Manual**).

a) If you select **NTP**, accept or revise the NTP servers as desired (you are limited to only three NTP servers), and in **Time Zone**, select the desired time zone from the drop-down list.

b) If you select **Manual**, in **Time Zone**, select the desired time zone from the drop-down list, click the **Calendar** icon and select the desired day in the month, and adjust the **Hour** and **Minute** sliders to the desired time (or click **Now** to choose the current date and time), and click **Done**.

c) Click **Next** to continue with the initial configuration process (or click **Back** to return to the previous page, or click **Exit** to close the **Initial System Configuration Wizard**)

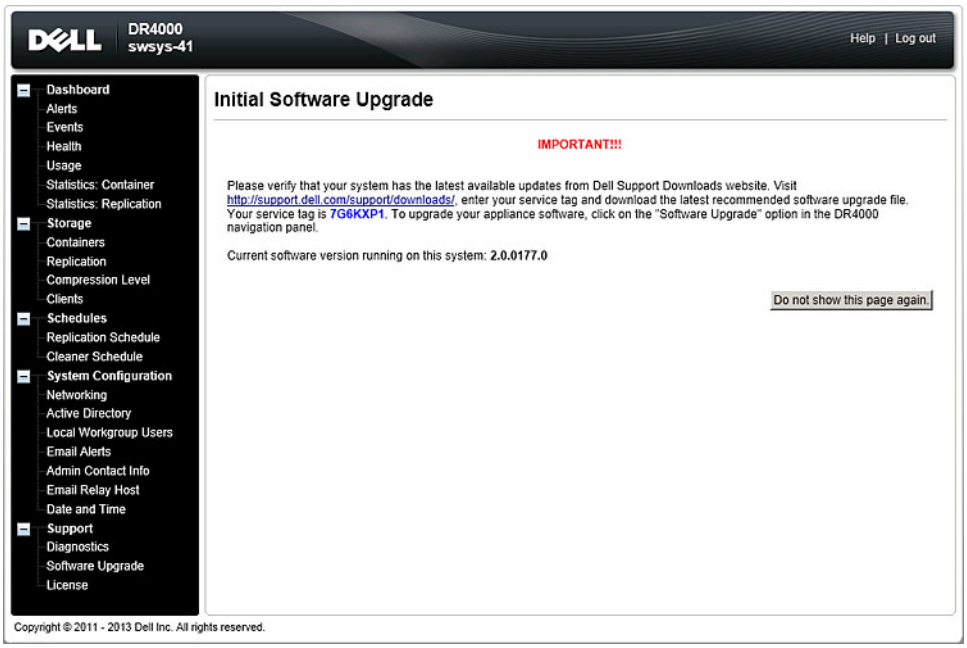
For more information, see Configuring System Date and Time Settings.

NOTE: Dell recommends using NTP when the DR Series system is part of a workgroup and not part of an domain. When the DR Series system is joined to a domain, such as the Microsoft Active Directory Services (ADS) domain, NTP is disabled.

The **Initial Configuration — Summary** page is displayed.

8. The **Initial Configuration — Summary** page displays a summary of all of the initial configuration changes you have made. Click **Finish** to complete the **Initial System Configuration Wizard** (or click **Back** to return to a previous page to change a setting).

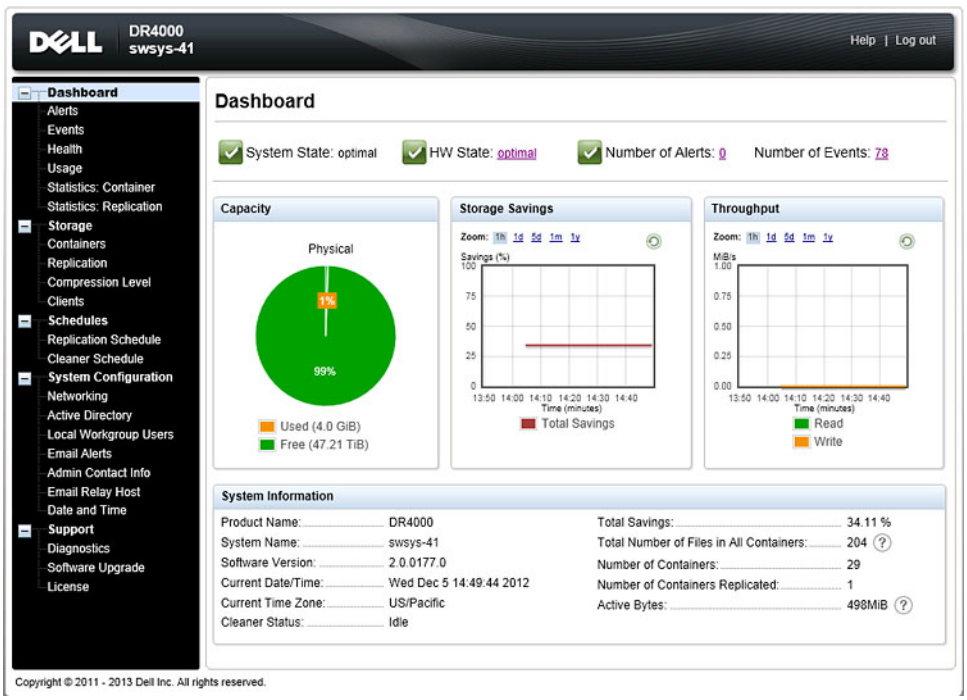
The **Initial Software Upgrade** page is displayed and prompts you to verify the current installed system software version.



9. Click **Dashboard** in the navigation panel,

The DR Series system main window consists of the following components:

- Navigation panel
- System Status bar
- System Information pane
- Command bar



1	Navigation Panel (left-hand column: **Dashboard**, **Storage**, **Schedules**, **System Configuration**, and **Support**)	2	System Status Bar (with system status indicators: **System State**, **HW State**, **Number of Alerts**, and **Number of Events**)
3	System Information Pane (with key system information categories)	4	Command Bar (with the **Help** and **Log out** options)

NOTE: Located on the **DR Series System Dashboard** page command bar, you can display the Help system documentation by clicking **Help**, or logout of the system by clicking **Log out**.

NOTE: When logged in, a **Logout Confirmation** dialog is displayed after 45 minutes of non-use. This dialog displays for 30 seconds before the DR Series system performs a forced timeout. Click **Continue** to reset the 45-minute logout timer. If you do not click **Continue** before the 30-second interval elapses, the DR Series system logs you out. You must log in again to resume using the DR Series system features and GUI.

Before managing data using the system navigation panel options, you should understand the options and capabilities you can use. The navigation panel contains the following sections that let you manage your data:

- **Dashboard**
- **Storage**
- **Schedules**
- **System Configuration**
- **Support**

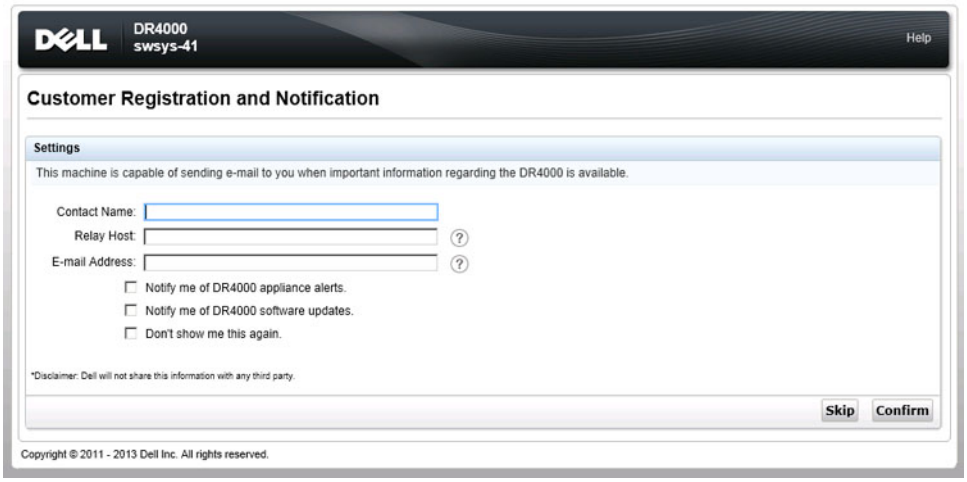
Registering a DR Series System

Before you can start using the DR Series system using its graphical user interface (GUI) for the first time, you must properly register the system with Dell by completing the **Customer Registration and Notification** page. In addition to registering your system, you can also sign up to be notified about appliance alerts and system software updates. The **Customer Registration and Notification** page is displayed when you initially log into a Release 2.0 DR Series system using a web interface connection, and it consists of the following text boxes and check boxes in the Settings pane:

- **Contact Name**
- **Relay Host**
- **Email Address**
- **Notify me of DR4000 appliance alerts**

  NOTE: If this check box is selected, you are notified of all warning and critical severity system alerts, which are the types that may require user action. For more information, see Displaying System Alerts.
- **Notify me of DR4000 software updates**

  NOTE: If this check box is selected, you are notified by Dell about any new system software upgrades or maintenance releases. For more information, see Software Upgrade Page and Options.
- **Don't show me this again**


DR4000
swsys-41
Help
Customer Registration and Notification
Settings
This machine is capable of sending e-mail to you when important information regarding the DR4000 is available.
Contact Name:
Relay Host:
E-mail Address:
Notify me of DR4000 appliance alerts.
Notify me of DR4000 software updates.
Don't show me this again.
*Disclaimer: Dell will not share this information with any third party.
Skip
Confirm
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NOTE: DR4000 systems that run system software versions earlier than 2.0 that later upgrade to the 2.0 release will see this screen display when logging into the DR Series system following the upgrade process.

To register a DR Series system, complete the following:

1. In **Contact Name**, enter the name of the DR Series system contact.
2. In **Relay Host**, enter the hostname or IP address for the DR Series system email relay host.
3. In **Email Address**, enter an email address for the system contact.
4. To be notified about DR4000 appliance alerts, select the **Notify me of DR4000 appliance alerts** check box.
5. To be notified about DR4000 software updates, select the **Notify me of DR4000 software updates** check box.
6. To not display the **Customer Registration and Notification** page again, select the **Don't show me this again** check box.
7. Click **Confirm** for the DR Series system to accept your values (or click **Skip**) to proceed to the **Initial System Configuration Wizard** page.

Enabling Active Scripting in Windows IE Browsers

To enable **Active Scripting** (JavaScript) in Microsoft Windows Internet Explorer (IE) web browsers, complete the following:

NOTE: This procedure describes how to configure your Windows IE web browser to enable **Active Scripting** (JavaScript). This setting is often disabled by default on Windows-based servers

1. Launch the IE web browser, and click **Tools**→ **Internet Options**.
   The **Internet Options** page is displayed.
2. Click the **Security** tab, and click **Custom level...**.
   The **Security Settings — Local Intranet Zone** page is displayed.
3. Using the right scroll bar, scroll down the **Settings** choices until you reach **Scripting**.
4. In **Active scripting**, click **Enable**.
5. Click **OK** to enable JavaScript and the Active Scripting feature for your web browser.
   The **Internet Options** page is displayed.
6. Click **OK** to close the **Internet Options** page.

Disabling the Compatibility View Settings

To disable the **Compatibility View** settings of the IE web browser you are using to log in to access the DR Series system graphic user interface (GUI), complete the following:

NOTE: This procedure describes how to disable the **Compatibility View** settings to ensure there is no conflict between different versions of the Microsoft Internet Explorer (IE) web browser you use to access the DR Series system. Disabling the compatibility view settings requires that the **Display all websites in Compatibility View** check box option in the **Compatibility View Settings** page remains unselected, and that there are no DR Series systems or domains associated with these systems listed in the Compatibility View list on this page.

1. Launch the IE web browser, and click **Tools**→ **Compatibility View settings**.
   The **Compatibility View Settings** page is displayed.
2. If selected, deselect the **Display all websites in Compatibility View** check box option.
3. If any DR Series systems are listed in the Compatibility View list, select the entry and click **Remove**.
   Repeat this step for any additional DR Series systems that are listed.
4. Click **Close** to exit from the **Compatibility View Settings** page.

Dashboard Page and Options

By default, the **Dashboard** page is displayed after logging on, which displays the following current system-related information:

- **System Status**
  - System State
  - HW (Hardware) State
  - Number of Alerts
  - Number of Events
- **Capacity**
- **Storage Savings**
- **Throughput**
- **System Information**

NOTE: To refresh the values listed in **Storage Savings** and **Throughput**, click .

NOTE: In the DR Series system navigation panel, the **Dashboard** section consists of the following menu options that when selected display the corresponding page:

- **Alerts**
- **Events**
- **Health**
- **Usage**
- **Statistics: Container**
- **Statistics: Replication**

For more information, see the following:

- Understanding the Dashboard Options

- Using the Dashboard Alerts Page
- Using the Dashboard Events Option
- Using the Dashboard Page to Monitor System Health
- Using the Dashboard to Display System Events

Understanding the Dashboard Options

The DR Series system provides a mechanism for viewing and accessing the latest information about the system as soon as you log in. The **Dashboard** section of the navigation panel (which displays the **Dashboard** page by default) lists the current system status and provides the following menu options, that when selected, display the corresponding pages:

- **Alerts**
- **Events**
- **Health**
- **Usage**
- **Statistics: Container**
- **Statistics: Replication**

Displaying System Alerts

To display the **Alerts** page, click **Dashboard** → **Alerts**, or click the **Number of Alerts** link on the **Dashboard** page.

The **Alerts** page displays the Current Time Zone (for example, US/Pacific), the Number of Alerts, and a system alerts summary table that lists the total number of system alerts by index number, timestamp, and a brief message that describes the alert.

Unresolved critical events become system alerts, which will clear when the problem is resolved. For more information, see Monitoring System Alerts.

Events

The DR Series system provides two ways to display current system events in the **Events** page:

- Click **Dashboard**→ **Events** .
- Click **Number of Events** link on the **Dashboard** page.

The **Events** page provides an Event Filter pane, which is where you can set specific search criteria based on selected event severity, and starting and ending date setpoints. Once you set the search criteria, click **Start Filter** to display the events matching your values.

Matching events are displayed in a Events summary table that lists the total number of system events that match the search criteria you defined, and defines each matching system event by:

- Index number
- Event severity: critical, warning, or info (informational)
- Timestamp
- Message (brief description of system event)

In the **Events** page, set the search criteria for a specific system event type (or all recorded system events) based on the following:

- In **Event Severity**, select the event severity to search for from the options in pull-down list: **ALL**, **CRITICAL**, **WARNING**, and **INFO**.
- In **Message Contains**, enter the word or string of words to search for in the events message text (the DR Series system performs a case-insensitive match based on your entry).
- In **Timestamp From**, enter starting time in field or click calendar icon to choose month and day, enter starting time using the **Hour** and **Minute** sliders, or click **Now** to set the current time, and click **Done**.
- For **Timestamp To**, enter starting time in field or click calendar icon to choose month and day, enter ending time using the **Hour** and **Minute** sliders, or click **Now** to set the current time, and click **Done**.
- Click **Start Filter** display all search results that match the selected criteria, or click **Reset** to return all search settings to their default values.

All critical system events remain in the event list as a system historical record. For more information, see Monitoring System Events, and Using the Event Filter.

Health

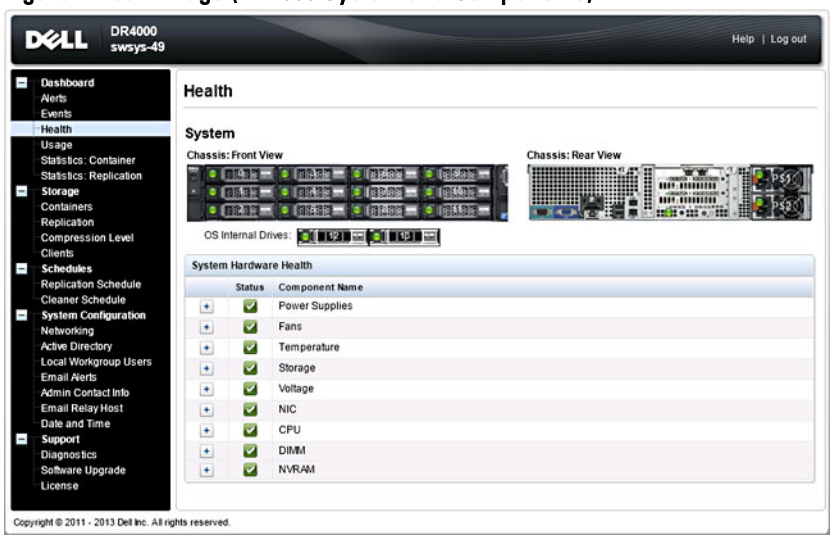
You can use the **Health** page to display and view the current state of the DR Series systems, DR4000 and DR4100, (see Figures 1 and 2).

To display the **Health** page, click **Dashboard** → **Health** or click the **HW State** link on the **Dashboard** page. Both methods display this page, which shows the current state of the system hardware (and any installed data storage expansion shelf enclosure).

The **Health** page contains up to three tabs if the maximum number of supported expansion shelves are installed (for example: **System**, **Enclosure 1**, and **Enclosure 2**). If no expansion shelves were installed, there will be only be one tab displayed (**System**).

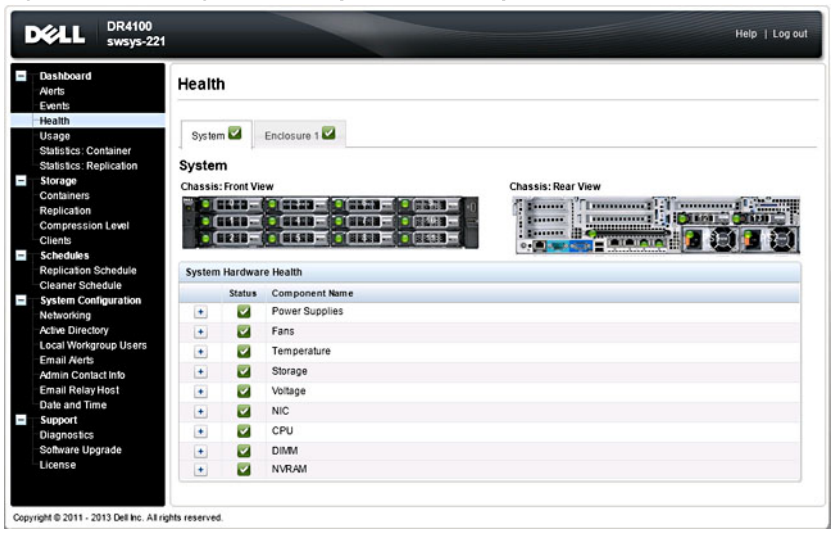
Health Page: DR4000 System

Figure 1 Health Page (DR4000 System and Components)



Health Page: DR4100 System

Figure 2 Health Page (DR4100 System and Components)



By default, the **System** tab is displayed first, and it lists the following attributes for each of its hardware components:

DR Series System Components

In the **System** tab on the **Health** page, the following images and System Hardware Health table display the status of the system components (for specific locations, see Figures 1 and 2).

- Chassis: front view (image)—shows the 0 -11 drive locations and status
- Chassis rear view (image)—shows power supply locations and status, and positions of rear panel connectors
- OS internal drives (image)—shows the status for the operating system internal drives
- System Hardware Health (table)—shows the current status for all of the major hardware subcomponents in the appliance:
  - Power Supplies—status, name, and location
  - Fans—status, name, speed, and identifier
  - Temperature—status, name, and temperature
  - Storage—storage controller, storage virtual disks, storage physical disks, storage controller battery, and storage cache

    NOTE: The storage controller battery state displays either as *Ready* or *Charging* (the latter indicates this state after a system reboot until the storage controller battery is fully charged).
  - Voltage—status, name, voltage, and probe name
  - NIC (network interface card)—status, name, type, and speed
  - CPU (central processing unit)—status and name
  - DIMM (dual in-line memory module)—status, name, and connector name
  - NVRAM (non-volatile random access memory)—NVRAM (status, name, errors, temperature, SSD state, SSD health, SSD firmware version, serial number, and firmware version); NVRAM super capacitor (status, name, state, voltage, and maximum design voltage)

NOTE: To display the current status, name, and state of chassis components, scroll your mouse over the desired component.

All system hardware components are listed in the System Hardware Health pane by component name, status, and other attributes. The following table identifies the component status by one of three color-coded icons that reflect its state.

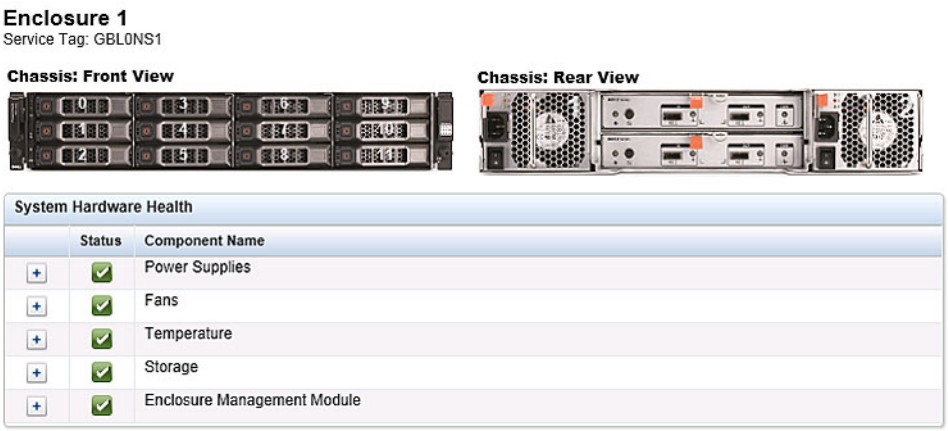
Icon	Description
	This color code icon indicates that the component status is operating at an optimal state.
	This color code icon indicates that the component status is a operating under a warning state (a non-critical error has been detected).
	This color code icon indicates that the component status is operating under an error or actionable state (a critical error has been detected).

To expand any component category to display more status details for each related subcomponent, click **+** ("plus sign" icon) in the System Hardware Health pane. To contract any expanded component category, click **—** ("minus sign" icon). For more information, see Monitoring System Health.

DR Series System Enclosures

In the **Enclosure** tab on the **Health** page, the following images and System Hardware Health table display the status of the expansion shelf enclosure components (for specific locations, see Figure 3).

Figure 3 Expansion Shelf Components



- Chassis: front view (image)—shows the 1 -11 drive locations and status; drive 0 is the dedicated hot spare for RAID 6
- Chassis rear view (image)—shows cooling fan locations and status, and positions of rear panel connectors
- Service Tag—lists the service tag for the selected expansion shelf
- System Hardware Health (table)—shows the current status for all of the major hardware subcomponents in the expansion shelf:
  - Power Supplies—status, name, and location
  - Fans—status, name, speed, and identifier
  - Temperature—status, name, and temperature
  - Storage—storage physical disks (status, slot, serial number, state, GHS status, spare state, smart alert, and size)
  - Enclosure Management Module (status, name, identifier, and Nexus ID)

Usage

To display the **Usage** page, click **Dashboard** → **Usage**. The **Usage** page consists of options, pull-down lists, and tabs that let you filter the DR Series system usage statistics that you want to view, which include:

- **Latest Range** and **Display last...**—these options display system usage details for based whether you select **Latest Range** or **Time Range**.
- **System Usage** tabs—displays system usage based on the **Latest Range** or **Time Range** option that you selected, and represented by the following tabs: **CPU Load**, **System**, **Memory**, **Active Processes**, **Protocols**, **Network**, **Disk**, and **All**.

NOTE: If you click the **All** tab, this action displays the system usage that is defined by the range and display options you selected, and the file system protocols you have configured. To view all of the displayed usage categories, use the scroll bar on the right-hand side of the page.

Viewing the Latest Range

The **Usage** page lets you filter the system usage statistics you want to view. To view the **Latest Range** statistics, complete the following:

NOTE: The **Usage** page also displays the Current Time Zone in use for the system.

1. Click the **Latest Range** option.
2. Select the desired Hours, Days, or Months duration in the **Range** pull-down list.
3. Enter the desired value in the **Display last...** drop-down list.
   For the Hours duration, this 1–24 hours; for the Days duration, this is 1–31 days; for the Months duration, this 1–12.
4. Click **Apply**.
5. Click one of the seven desired tabs to view a specific set of usage statistics, or click **All** to display the entire set of system usage statistical graphs.
   The seven **Usage** page tabs include: **CPU Load**, **System**, **Memory**, **Active Processes**, **Protocols**, **Network**, **Disk**, and **All**.

If you click **All**, the following set of statistics are displayed:

- CPU Load
- System Usage
- Memory Usage — Total
- Memory Usage — Real
- Active Processes — Total
- NFS Usage — Total
- CIFS Usage — Total
- OST Usage — Total
- Network Usage
- Socket Usage — Total
- Active Connections
- Disk Usage — Meta Data
- Disk Usage — Data Storage

For information on viewing specific Time Range statistics on the **Usage** page, see Viewing a Specific Time Range.

Viewing a Specific Time Range

The **Usage** page lets you filter the system usage statistics you want to view. To view a specific **Time Range**, complete the following:

NOTE: The **Usage** page also displays the Current Time Zone in use for the system.

1. Click the **Time Range** option.
2. Type the desired start date in **Start Date** (or click the calendar icon and make your date selection), or click **Now** to select the current time (or use the **Hour** and **Minute** sliders to set a desired time), and click **Done**.
3. Type the desired end date in **End Date** (or click the calendar icon and make your date selection), or select the **Set "End Date" to current time** to set the end date to the current day and time, or click **Now** to select the current time (or use the **Hour** and **Minute** sliders to set a desired time), click **Done**, and click **Apply**.

   The seven **Usage** page tabs include: **CPU Load**, **System**, **Memory**, **Active Processes**, **Protocols**, **Network**, **Disk**, and **All**.

If you click **All**, the following set of statistics are displayed:

- **CPU Load**
- **System Usage**
- **Memory Usage — Total**
- **Memory Usage — Real**
- **Active Processes — Total**
- **NFS Usage — Total**
- **CIFS Usage — Total**
- **OST Usage — Total**
- **Network Usage**
- **Socket Usage — Total**
- **Active Connections**
- **Disk Usage — Meta Data**
- **Disk Usage — Data Storage**

For information on viewing the Latest Range statistics on the **Usage** page, see Viewing the Latest Range.

System Usage

This **Usage** page is where the DR Series system usage is displayed based on the **Latest Time** or **Time Range** values you selected. System usage statistics are grouped and represented by the following tabs:

- **CPU Load**
- **System**
- **Memory**
- **Active Processes**
- **Protocols**
- **Network**
- **Disk**
- **All**

NOTE: If you click **All**, this displays system usage defined by the range and display options you select, and the file system protocols you have configured. To view all of the displayed usage categories, use the scroll bar on the right-hand side of the page.

The **All** tab displays the entire set of system status categories in graphic screen format (depending upon your file system protocol type):

- **CPU Load**
- **System Usage**
- **Memory Usage - Total**
- **Memory Usage - Real**
- **Active Processes - Total**
- **NFS Usage - Total**
- **CIFS Usage - Total**
- **OST Usage - Total**
- **Network Usage**
- **Socket Usage - Total**
- **Active Connections**
- **Disk Usage - Meta Data**
- **Disk Usage - Data Storage**

For more information, see Monitoring System Usage.

Statistics: Container Page

To display the **Statistics: Container** page, click **Dashboard** → **Statistics: Container** . This page lets you select from the **Container Name** drop-down list, and based on the container you select, displays a variety of statistics for the specified container:

NOTE: The DR Series system polls for statistics every 30 seconds.

- Backup Data pane: displays the current number of active files ingested (based on time/minutes) and the current number of active bytes (mebibytes/MiB) ingested based on time in minutes. You can choose to click **Zoom** to view the backup data active files and active bytes statistics in other than the default mode of 1h (1–hour). The other selectable viewing options are 1d (1–day), 5d (5–day), 1m (1–month), and 1y (1–year).
- Throughput pane: displays the current number of Mebibytes/second (MiB/s) for read operations (based time/minutes) and the current number of MiB/s for write operations (based on time/minutes). You can choose to click **Zoom** to view the throughput statistics in other than the default mode of 1h (1–hour). The other viewing options are 1d (1–day), 5d (5–day), 1m (1–month), and 1y (1–year) that you can select.

  NOTE: To refresh the values listed in the Backup Data and Throughput panes, click .
- Marker Type and Connection Type pane: displays the marker type associated with the selected container (for example CommVault, Networker, TSM (Tivoli Storage Manager), or ARCserve, and the Connection Type (NFS, CIFS, or OST).
- If the selected container includes an NFS connection type, there will be an NFS Connection Configuration pane that displays the following categories: NFS Access Path, Client Access, NFS Options, and Map Root To.
- If the selected container includes a CIFS connection type, there will be a CIFS Connection Configuration pane that displays the following categories: CIFS Share Path and Client Access.
- If the selected container includes an OST connection type, the OST login entry user is listed (for example, backup_user), and there are three tabs: **Capacity**, **Duplication**, and **Client Statistics**. The **Capacity** tab displays a Capacity pane with the following categories: Status, Capacity, Capacity Used, and Total Images. The **Duplication**

tab displays a Duplication Statistics pane with the following Inbound and Outbound categories: Bytes Copied (logical), Bytes Transferred (actual), Network Bandwidth Savings, Current Count of Active Files, and Replication Errors. In addition, this tab also displays a Recent Number of Optimized Copies table, that lists the file name, peer IP, peer ID, logical bytes to send, replication rate, savings, and replicated at location. The **Client Statistics** tab displays a Client Statistics pane with the following categories: Images Ingested, Images Complete, Images Incomplete, Images Restored, Bytes Restored, Image Restore Errors, Image Ingest Errors, Bytes Ingested, Bytes Transferred, and Network Savings.

- (Optional) Replication pane: displays the Replication Configuration and Replication Status panes. The Replication Configuration pane identifies whether the current container state (Enable or Disable), Role (source or target), Remote Container Name, Bandwidth, and the Encryption being used. The Replication Status pane identifies the Peer State, Replication State, Replication Average Transfer Rate, Replication Peak Transfer Rate, Network Average Transfer Rate, Network Peak Transfer Rate, Network Bytes Sent, Estimated Time to Sync (in days, hours, minutes, and seconds), Savings (in percentage), Last Insync Time (in timestamp format), and Schedule Status.

NOTE: The Replication pane is only displayed in the **Statistics: Container** page if the selected container is configured for replication.

Backup Data Pane

The Backup Data pane in the **Statistics: Container** page displays the following graphed information:

- Current number of active files ingested (based on time in minutes)
- Current number of active bytes (Mebibytes/MiB) ingested (based on time in minutes)

You can choose to display this information in 1–hour (1h), which is the default, or in 1–day (1d), 5–day (5d), 1–month (1m), and 1–year (1y) increments for both the Active Files and Active Bytes graphs.

NOTE: To refresh the values listed in Backup Data and Throughput panes, click .

Throughput Pane

The Throughput pane in the **Statistics: Container** page displays the following statistics for any existing container that you select in the **Container Name** drop-down list:

- Current number of Mebibytes/per second (MiB/s) for read operations (based on time/minutes)
- Current number of MiB/s for write operations (based on time/minutes)

NOTE: To refresh the values listed in Backup Data and Throughput panes, click .

Replication Pane

The Replication section in the **Statistics: Container** page consists of two panes: Replication Configuration and Replication Status. This section of this page is only displayed when there are replication statistics for a selected container that has been configured for replication.

Replication Configuration Pane

This pane contains the following fields:

- **Enable** (for example, Yes or No)
- **Role** (for example, Source or Target)
- **Remote Container Name** (for example, IP Address or hostname)
- **Bandwidth** (for example, Default, KiB/s, MiB/s, and GiB/s)
- **Encryption** (for example, None, AES 128–bit, or AES 256–bit)

Replication Status Pane

This pane contains the following fields:

- **Peer State** (for example, online)
- **Replication State** (for example, INSYNC)
- **Replication Average Transfer Rate** (for example, 1005 KiB/s)
- **Replication Peak Transfer Rate** (for example, 2253 KiB/s)
- **Network Average Transfer Rate** (for example, 2024 KiB/s)
- **Network Peak Transfer Rate** (for example, 2995 KiB/s)
- **Network Bytes Sent** (for example, 69.79 KiB)
- **Estimated Time to Sync** (for example, 14 days 32 hours 46 minutes, and 33 seconds)
- **Savings** (for example, 27.99 %)
- **Last INSYNC Time** (for example, 2012–11–04 16:45:53)
- **Schedule Status** (for example, Outside window: starts in 2 days, 1 hours, 13 minutes 21 seconds)

NOTE: The **Replication** pane is only displayed in the **Statistics: Container** page if the selected container is configured for replication.

Connection Type Pane

The Connection Type pane is part of the **Statistics: Container** page, and the information displayed in this pane depends upon the connection type of the selected container:

- NFS containers—lists the following NFS connection configuration information:
  - NFS Access Path
  - Client Access
  - NFS Options
  - Map Root to
- CIFS containers—lists the following CIFS connection configuration information:
  - CIFS Share Path
  - Client Access
- OST containers—lists the following OST connection configuration information, grouped under the following tabs:
  - **Capacity** tab—Status, Capacity, Capacity Used, and Total Images.
  - **Duplication** tab— the Duplication Statistics pane displays both Inbound and Outbound categories with the following statistic types: Bytes Copies-logical, Bytes Transferred-actual, Network Bandwidth Savings-in percentage, Current Count of Active Files, and Replication Errors. The Recent Number of Optimized Copies pane displays a summary table that lists each entry by the following: File Name, Peer IP, Peer ID, Logical Bytes to Send, Replication Rate, Savings, and Replicated at categories.
  - **Client Statistics** tab—contains the Client Statistics pane, which displays Images Ingested, Images Complete, Images Incomplete, Images Restored, Bytes Restored, Image Restore Errors, Image Ingest Errors, Bytes Ingested, Bytes Transferred, and Network Savings (in percentage) statistics.

For more information, see Monitoring Container Statistics.

Duplication Statistics

The Duplication Statistics pane displays duplication statistics (which are also known as file copy statistics) for OST connection type containers. To view these duplication statistics, navigate to the **Statistics: Container** page, select an

OST connection type container in the **Container Name** pull-down list, and select the **Duplication** tab. The Duplication Statistics pane displays the following statistics types:

- **Inbound**:
  - Bytes Copied (logical): displayed in bytes
  - Bytes Transferred (actual): displayed in bytes
  - Network Bandwidth Savings: (displayed by percentage)
  - Current Count of Active Files: displayed in numbers of files
  - Replication Errors: displayed in numbers of errors
- **Outbound**:
  - Bytes Copied (logical): displayed in bytes
  - Bytes Transferred (actual): displayed in bytes
  - Network Bandwidth Savings: (displayed by percentage)
  - Current Count of Active Files: displayed in numbers of files
  - Replication Errors: displayed in numbers of errors

Recent Number of Optimized Copies

When a OST container is selected in the **Statistics: Container** page, you can display the Recent Number of Optimized Copies summary table in the Connection Type: OST pane. This pane, its tabs, and the summary table are displayed only when the **Duplication** tab is selected and an OST connection type container is selected in the **Container Name** pull-down list.

Recent Number of Optimized Copies Summary Table

This summary table contains the following information about the optimized copies:

- **File Name**
- **Peer IP**
- **Peer ID**
- **Logical Bytes to Send**
- **Replication Rate**
- **Savings** (in percentage)
- **Replicated at** (in yyyy-mm-dd hh:mm:ss format)

Client Statistics

You can display client statistics in the **Statistics: Container** page that correspond to any container that is configured as an OST connection type. To display client statistics, click the name of the OST container in the **Container Name** drop-down list, and click the **Client Statistics** tab in the Connection Type: OST pane. This action displays the following Client Statistics types for the selected OST container:

- Images Ingested
- Images Complete
- Images Incomplete
- Images Restored
- Bytes Restored
- Image Restore Errors
- Image Ingest Errors
- Bytes Ingested

- Bytes Transferred
- Network Savings (in percentage)

For more information, see Monitoring Container Statistics.

Statistics: Replication Page

To display the **Statistics: Replication** page, click **Dashboard** → **Statistics: Replication**. This page lets you view and monitor statistics for replication containers or peer DR Series systems that you select, and consists of two main panes:

- **Replication Filter**—the **Container Filter** lets you select all, one, or multiple replication containers, one or more peer systems, and configure a variety of statistics types to display in the Replication statistics summary table. You can choose from the 10 **Headers** check boxes: Peer Status, Replication Status, Time To Sync, Progress %, Replication Throughput, Network Throughput, Network Savings, Last Time In Sync, Peer Container, and Peer System to filter the type of replication statistics used in the search.
- **Replication Statistics**—contains a summary table that displays the filtered results of the replication statistics from the Replication Filter pane for the container or peer system choices you made. The summary table displays the category of statistics based on the check boxes you selected.

NOTE: Starting with Release 2.0, the DR Series system software includes version checking that limits replication only between other DR Series systems that run the same system software release version (DR Series systems running Release 2.0.x software can only replicate with other DR Series systems that run the same release system software). For example, Release 2.0.x systems will not be able to replicate with Release 2.1 or Release 3.0 systems, but can replicate with systems running Release 2.0.0.1 or 2.0.0.2.

For more information, see Monitoring Replication Statistics, Displaying Replication Statistics, and Displaying the Statistics: Replication Page.

Container Filter

The Replication Filter pane in the **Statistics: Replication** page contains the following components:

- Container Filter:
  - **All** (selecting this option lets you select all replication containers in the system)
  - **Name** (selecting this option and drop-down list lets you select replication containers)
  - **Peer System** (selecting this option and list box let you select peer DR Series systems)
- **Headers** (selecting the following check boxes let you filter for specific replication statistic types)
  - Peer Status
  - Replication Status
  - Time to Sync
  - Progress % (percentage)
  - Replication Throughput
  - Network Throughput
  - Network Savings
  - Last Time in Sync
  - Peer Container
  - Peer System

NOTE: The DR Series system polls for statistics every 30 seconds.

After you have configured the Replication Filter settings, click **Apply Filter** to display the filtered set of replication statistics in the Replication Filter summary table. The Replication filter summary table lists the replication statistics that

correspond to the check boxes you selected (by default, Peer Status, Replication Status, Network Throughput, Network Savings, and Progress Percentage check boxes are selected and are displayed in the table). To reset the check box selections, click **Reset**.

NOTE: If you select more than five statistics types, use the horizontal scroll bar to scroll and display the additional columns of statistics.

For more information, see Monitoring Replication Statistics.

Storage Page and Options

To display the **Storage** page, click **Dashboard** → **Storage**. This page displays system-related storage information in the following panes:

NOTE: The DR Series system polls and updates statistics every 30 seconds.

- **Storage Summary**:
  - Number of Containers
  - Number of Containers Replicated
  - Total Number of Files in All Containers
  - Compression Level
- **Capacity**:
  - Used and free system physical capacity in both percentages and Gibibytes (GiB) or Tebibytes (TiB)
- **Storage Savings**:
  - Total savings (deduplication and compression) graphed in percentages and based on time in minutes; you can display the statistics in 1–hour (1h), 1–day (1d), 5–day (5d), 1–month (1m), and 1–year (1y); 1–hour is the default.
- **Throughput**:
  - Read and write rates graphed in Mebibytes per second (MiB/s) and based on time in minutes; you can display the statistics in 1–hour (1h), 1–day (1d), 5–days (5d), 1–month (1m), and 1–year (1y); 1–hour the default.
- **Physical Storage**:
  - Type: internal or external storage (external is the expansion shelf enclosure)
  - Raw Size (storage capacity listed in Gigabytes or Terabytes)
  - % Used (represents the percent of capacity used)
  - Service Tag (tag is a unique 7–digit Dell ID)
  - Configured (status is listed as yes, no, add, or detect)
  - State (storage status is ready, reading, initializing, rebuilding, or not detected)

NOTE: To refresh the values listed in **Storage Savings** and **Throughput** , click . To refresh an expansion shelf enclosure, click **Detect** under the Configured column in the Physical Storage summary table (the **Enclosure Detect** dialog is displayed with this message: *If the enclosure is undetected, please wait five minutes and try again. If the enclosure still remains undetected after an attempt, keep the enclosure powered On and reboot the appliance*).

For more information about DR Series system container operations, see Managing Container Operations.

Understanding the Storage Options

The DR Series system provides a mechanism for storing backed up and deduplicated data that has been ingested by the system into easily accessible storage containers. The DR Series system graphical user interface (GUI) simplifies the process for storing this type of data via its system storage processes. The **Storage** section of the navigation panel identifies the following menu options, that when selected, display the corresponding pages:

- **Containers**
- **Replication**
- **Compression Level**
- **Clients**

Containers

To display the **Containers** page, click **Storage**→ **Containers**. This page displays the total number of containers (**Number of Containers**) and the container path (**Container Path: /containers**). This page lets you perform the following tasks using its options: **Create**, **Edit**, **Delete**, and **Display Statistics**. These options let you do the following:

- Create new containers
- Edit existing containers
- Delete existing containers
- Display container, connection, and replication statistics

The **Containers** page also displays a Containers summary table that displays the following types of container-related information:

- Containers—lists containers by name
- Files—lists the number of files in each container
- File type— lists the connection type per container:
  - Network File System (NFS)
  - Common Internet File System (CIFS)
  - OpenStorage Transport (OST)
- Replication status—lists the current replication state per container:
  - Not Configured
  - Stopped
  - Disconnected
  - Trying to Connect
  - Online
  - N/A
  - Marked for Deletion

NOTE: For newly created OST containers, the Replication status displays **N/A**. When replication data has been deleted from an existing OST container, the Replication status also displays **N/A**. For existing containers that are in the process of deleting a large amount of data, the Replication status displays **Marked for Deletion** to indicate that the data deletion process has not yet completed.

NOTE: Use **Select** to identify the container on which you want to perform an action. For example, click **Select**, and click **Display Statistics** to display the **Statistics: Container** page for the container you selected.

Replication Page

To display the **Replication** page, click **Storage** → **Replication**. The **Replication** page displays the number of source replications, the names of the local and remote containers, the peer state, and the bandwidth selected per container. The **Replication** page lets you perform the following tasks:

- Create a new replication relationship (source and target pair) and select the type of encryption to use
- Edit or delete an existing replication relationship
- Start or stop replication between a replication pair
- Set the bandwidth (or speed limit) for the replication process
- Display statistics for an existing replication relationship

The **Replication** page contains a Replication summary table that lists the following replication-related information:

- **Local Container Name**—local container name (IP address or hostname)
- **Role**—source or target in the replication process
- **Remote Container Name**—remote container name (IP address or hostname)
- **Peer State**—Online, Offline, Paused, or Disconnected

  NOTE: When started, the **Peer State** displays the status as *Online* for the selected container. When stopped, the Peer State initially displays the status as *Paused*, and then changes to *Offline*.
- **Bandwidth**—settings include Kibibytes per second (KiB/s), Mebibytes per second (MiB/s), Gibibytes per second (GiB/s), or default (an unlimited bandwidth setting)

  NOTE: Click **Select** to identify the replication relationship on which you want to perform an action. For example, click **Select**→ **Display Statistics** to display the **Statistics: Replication** page for the container you selected. For more information, see Statistics: Replication Page.

Compression Level

To display the **Compression Level** page, click **Storage** → **Compression Level** . This page lets you set or edit the data compression level that you want used on all of the incoming data that is to be backed up and deduplicated by the DR Series system. Select a compression level setting using either of these options based on your preferences:

- **Fast**—provides a shorter time doing backups—this choice results in less space savings (this is the default setting).
- **Best**—provides the highest space savings—this choice results in a longer time doing backups.

For more information, see Configuring Compression Level Settings.

Clients

To display the **Clients** page, click **Storage** → **Clients**. This page displays the total number of clients that are connected to the DR Series system, which can be a combination of NFS, CIFS, and OST clients, and this total is listed above the three **Client** tabs (**NFS**, **CIFS**, and **OST** tabs).

In addition, depending upon the tab type you select, the number of clients for each connection type is displayed. For example, in the **Clients** page, if the **OST** tab is selected, this displays the number of current OST clients that correspond to this type (OpenStorage Technology or OST clients) that are connected to the system, and provides the following information client-related information:

- **Number of OST Clients**—lists number of OST clients
- **Name**—lists each client by name
- **Plug-In**—lists the plug-in type installed on each client
- **Backup Software**—lists the backup software used with each client
- **Idle Time**—lists the idle time (non-activity) for each client
- **Connection**—lists the number of connections for each client
- **Mode**—lists the current mode type for each client

To perform one of the possible actions on a client, click **Select** to identify the client, and then click the desired option (for example, the **OST** tab provides three options: **Update Client**, **Edit Password**, or **Download Plug-In**. For more information about using this page and its tabs, see Clients Page (Using the NFS or CIFS Tab) or Clients Page (Using the OST Tab).

Clients Page (Using the NFS or CIFS Tab)

To display the **Clients** page, click **Storage**→ **Clients**. This page displays the total number of clients that are connected to the DR Series system, and this number reflects all of the clients based listed under the **Clients** tabs (NFS, CIFS, and OST). Using this page and the **NFS** or **CIFS** tab lets you perform the following tasks for NFS or CIFS clients (for information about OST clients, see Clients Page (Using the OST Tab)). The **Clients** page displays a summary of the NFS (or CIFS) clients, and lists the following types of NFS and CIFS client-related information:

- **Number of NFS (or CIFS) Clients**—lists number of NFS (or CIFS) clients
- **Name**—lists each client by name
- **Idle Time**—lists idle time (non-activity) for each client
- **Connection Time**—lists connection time for each client

Clients Page (Using the OST Tab)

To display the **Clients** page, click **Storage**→ **Clients**. This page displays the total number of clients that are connected to the DR Series system, and this number reflects all of the clients based listed under the **Clients** tab (NFS, CIFS, and OST). Using this page and the **OST** tab lets you perform the following tasks for OST clients:

- Update a client (you are limited to modifying the mode type)
- Edit a client password
- Download a client plug-in

This page displays an OST Clients Summary table that lists the following types of OST client-related information:

- Name—lists client by name
- Plug-In—lists plug-in type that is installed on the client
- Backup Software—lists backup software used with this client
- Idle Time—lists the idle time for this client
- Connection—lists the number of connections for this client
- Mode—lists the mode types that can be set for this client:
  - **Auto**
  - **Passthrough**
  - **Dedupe** (deduplication)

NOTE: If an OST client has four or more CPUs, it is considered to be dedupe-capable. However, the OST client operating mode depends upon how it is configured in the DR Series system (**Dedupe** is the default OST client mode). If the administrator did not configure an OST client to operate in a specific mode and it is dedupe-capable, it will run in the **Dedupe** mode. If an OST client is not dedupe-capable (meaning the OST client has less than four CPUs), and the administrator sets it to run in the **Dedupe** mode, it will only run in the **Passthrough** mode. If an OST client is set to run in **Auto** mode, the OST client will run in the mode setting determined by the media server. The following table shows the relationship between the configured OST client mode types and the supported client mode based on client architecture type and corresponding number of CPUs.

Table 3. Supported OST Client Modes and Settings

OST Client Mode Settings	32–Bit OST Client (4 or more CPUs)	64–Bit Client (4 or more CPUs)	32–Bit OST Client (Less than 4 CPUs)	64–Bit OST Client (Less than 4 CPUs)
Auto	Passthrough	Dedupe	Passthrough	Passthrough
Dedupe	Not Supported	Supported	Not Supported	Not Supported
Passthrough	Supported	Supported	Supported	Supported

NOTE: Click **Select** to identify the OST client on which you want to perform an action. For example, click **Select** → **Download Plug-In** to display the **Download Plug-Ins** page for the client you selected with the following choice:

- Linux (64–bit), Red Hat Enterprise Linux (RHEL), versions 5.6 and 6
- SUSE (64–bit), SUSE Linux Enterprise Server (SLES), versions 10 and 11
- Windows (32–bit), Windows Server 2003 (SP2) and Windows Server 2008
- Windows (64–bit), Windows Server 2008, Release 2

About the Schedules Page and Options

To display the **Schedules** page, click **Dashboard** → **Schedules** . This page displays any existing Replication or Cleaner operations that have been set up for the DR Series system. If no times are listed, this indicates there are no scheduled Replication or Cleaner operations. The Replication and Cleaner operations will automatically run whenever the DR Series system detects a window of inactivity when there are no other major system operations running.

NOTE: Replication schedules can only be set on individual replication-enabled source containers.

The **Schedules** page lets you create a new schedule for running Replication or Cleaner operations, or you can modify an existing schedule for either of these operations. For more information about scheduling Replication or Cleaner operations, see Creating a Cleaner Schedule and Creating a Replication Schedule.

NOTE: Cleaner operations are system processes that reclaim disk space from containers where files were deleted. When no Cleaner schedule is set, the Cleaner process will run as needed.

The **Schedules** page displays the following:

- System Time Zone: using the following format (US/Pacific, Tue May 1 10:33:45 2012)
- Scheduled Replication operations: with day of the week (Sunday through Saturday), start time, and stop time
- Scheduled Cleaner operations: with day of the week (Sunday through Saturday), start time, and stop time

NOTE: Schedules only control the source container in scheduled Replication operations; the target container is passive in these operations.

Setting a Replication Schedule

To set a Replication schedule from the **Schedules** page, complete the following:

NOTE: Replication schedules can only be set on individual replication-enabled source containers.

NOTE: Starting with Release 2.0, the DR Series system software includes version checking that limits replication only between other DR Series systems that run the same system software release version (DR Series systems running Release 2.0.x software can only replicate with other DR Series systems that run the same release system software). For example, Release 2.0.x systems will not be able to replicate with Release 2.1 or Release 3.0 systems, but can replicate with systems running Release 2.0.0.1 or 2.0.0.2.

1. Click **Replication** on the options bar, which displays the **Replication Schedule** page.
   Another method to display the **Replication Schedule** page, click **Schedules** → **Replication Schedule**.
2. In **Container**, select a replication-enabled source container form the drop-down list.
3. Click **Schedule** to display the **Set Replication Schedule** window, and enter a **Start Time** and **Stop Time** (using the hour and minute pull-down lists) for each day of the week you want replication to be scheduled.
   For more information about Replication schedules, see Creating a Replication Schedule.

   NOTE: If either the **Create** or **Edit Schedule** options are disabled (grayed out), this means that there is no replication-enabled source container on which you can create a Replication schedule. You must first create a source container that can be replicated. For more information, see Creating Replication Relationships.

Setting a Cleaner Schedule

To set up a Cleaner schedule on the **Schedules** page, complete the following:

NOTE: For more information about setting a new or modifying an existing Cleaner schedule, see Creating a Cleaner Schedule.

1. Click **Schedules**→ **Cleaner Schedule** in the navigation panel, or click **Cleaner** on the **Schedules** page to display the **Cleaner Schedule** page.
2. If there is no Cleaner schedule, click **Schedule** to display the **Set Cleaner Schedule** window, and enter the **Start Time** and **Stop Time** (using the hour and minute pull-down lists) for each day of the week being scheduled.
   If there is an existing Cleaner schedule that you want to modify, click **Edit Schedule** and make your changes.

About the System Configuration Page and Options

To display the **System Configuration** page, click **Dashboard** → **System Configuration** . The **System Configuration** page displays the current DR Series system configuration information in the following panes:

- **Networking**
- **Active Directory**
- **Local Workgroup Users**
- **Email Alerts**
- **Admin Contact Info**
- **Email Relay Host**
- **Date and Time**

NOTE: Each pane title in the **System Configuration** page serves as a link. To display the corresponding page that provides more detailed information and the related options you can use, click the pane title link. For example, to display the **Date and Time** page, click the **Date and Time** pane title link.

The **System Configuration** page provides three options that let you:

- Edit the current system password

- Shut down the system
- Reboot the system

The **System Configuration** page provides the means for managing configuration settings for the **Networking**, **Active Directory**, **Local Workgroup Users**, **Email Alerts**, **Admin Contact Info**, **Email Relay Host**, and **Date and Time** pages in the system.

NOTE: For example, to manage the date and time configuration settings, click **Date and Time** to display the **Date and Time** page. You can then add or edit the following date and settings: **Mode**, **Time Zone**, and **Date and Time**. If the DR Series system is part of a workgroup and not joined to a Microsoft Active Directory Services (ADS) domain, you will also be able to add or edit the Network Time Protocol (NTP) servers associated with the system. However, when the DR Series system is joined to a domain, the **NTP Servers** setting on the **Date and Time** page is disabled and is not displayed.

NOTE: Dell recommends using NTP servers when the DR Series system will be running as part of a workgroup and not joined to a domain. The use of NTP servers as a reference time source is disabled when the DR Series system is joined to a domain.

System Configuration Page and Options

To display the **System Configuration** page, click **Dashboard** → **System Configuration** . This page displays the following pane title-enabled links that allow you to display more detailed system configuration information for the following categories:

- **Networking**
- **Active Directory**
- **Local Workgroup Users**
- **Email Alerts**
- **Admin Contact Info**
- **Email Relay Host**
- **Date and Time**

Networking

The Networking pane displays the currently configured Mode, Hostname, IP Address, Bonding, Domain Suffix, and Primary DNS settings for the DR Series system. The Networking pane title acts as a link to the **Networking** page:

- This page lists the Hostname, IP Address, DNS, Bonding, and installed NICs. The **Networking** page provides **Edit Hostname**, **Edit IP Address**, **Edit DNS**, **Edit Bonding**, and **Edit MTU** options.

Active Directory

The Active Directory pane displays the current status of the Domain Name for the DR Series system (not configured or listing the configured domain name). The Active Directory pane title acts as a link to the **Active Directory** page:

- This page contains a Settings and a CIFS Container Share Path pane. The Settings pane lists the configuration status, and lists the FQDN domain name (Fully Qualified Domain Name) of the Microsoft Active Directory Services (ADS) domain. The CIFS Container Share Path pane lists the current CIFS container share path locations. The **Active Directory** page provides the **Join** and **Leave** options.

Local Workgroup Users

The Local Workgroup Users pane displays the current configured local workgroup users (CIFS) for the DR Series system. The Local Workgroup Users pane title acts as a link to the **Local Workgroup Users (CIFS)** page:

- This page lists the configured local CIFS users by user name that belongs to the local workgroup in the DR Series system. The **Local Workgroup Users (CIFS)** page provides the **Create**, **Edit**, and **Delete** options (by which

you manage the users that belong to this local workgroup. To edit or delete an existing local workgroup user, click **Select** to identify the local user you wish to modify or delete.

Email Alerts

The Email Alerts pane displays the current number of email notification recipients configured for the DR Series system. The Email Alerts pane title acts as a link to the **Email Alerts** page:

- This page lists all currently configured recipient email addresses. The **Email Alerts** page provides **Add**, **Edit**, **Delete**, and **Send Test Message** options. To create an email recipient, click **Add** to display the **Add Recipient Email Address** dialog, in **Email Address** enter a valid email address for your email system, and click **Submit**. To edit or delete an existing email recipient, click **Select** to identify the email recipient in which you wish to modify, delete, or send a test message.

Admin Contact Info

The Admin Contact Info pane displays the current information associated with the administrator configured for the DR Series system. The current information is contained in the Contact Information and Notification panes. The Contact Information pan includes the Contact Information, Company Name, Email, Work Phone, and Comments categories. The Notification pane displays the status of the DR Series system appliance alerts and system software updates (disabled or enabled). The Admin Contact Info pane title acts as a link to the **Administrator Contact Information** page:

- This page contains contact information for the DR Series system administrator and is sent with all system alert email messages. The **Administrator Contact Information** page provides the **Add Contact Information** option (which after you configure it, this option changes to **Edit Contact Information**). Click the **Edit Contact Information** option to display the **Edit Administrator Contact Information** dialog where you can enter information or select a check box:
  - **Administrator Name**
  - **Company Name**
  - **Email**
  - **Work Phone**
  - **Comments**
  - **Notify me of DR4000 appliance alerts**
  - **Notify me of DR4000 software updates**

Email Relay Host

The Email Relay Host pane displays the current email relay host configured for the DR Series system. The Email Relay Host pane title acts as a link to the **Email Relay Host** page:

- This page lists the configured email relay host by its IP address or hostname that is responsible for email in the DR Series system. The **Email Relay Host** page provides the **Add Relay Host** option (which after you configure it, this option changes to **Edit Relay Host**).

Date and Time

The Date and Time pane displays the current Mode configured for the DR Series system (Manual or NTP), the current Time Zone, and the current Date and Time (in mm/dd/yy hh:mm:ss format, for example: 12/11/12 14:58:22 PST). The Date and Time pane title acts as a link to the **Date and Time** page:

- This page contains a Settings pane that lists the Mode used. The system uses Network Time Protocol (NTP) servers if the system is part of a workgroup and not joined to an Active Directory Services (ADS) domain. If the system is joined to an ADS domain, then the NTP servers setting is disabled and the system uses the ADS domain time. The Settings pane also displays the current Time Zone, and current Date and Time. The **Date and Time** page provides the **Edit** option for changing the date and time settings.

NOTE: Dell recommends using the Network Time Protocol (NTP) servers when the DR Series system is part of a workgroup and not part of a domain. The NTP time mode is disabled when the DR Series system is joined to an Active Directory Services (ADS) domain. Any attempt to enable the NTP time mode when you are joined to an ADS domain displays an error message indicating this is not possible.

Understanding the System Configuration Page Options

The **System Configuration** page contains three key system options:

- **Edit Password**
- **Shutdown**
- **Reboot**

Edit Password

Edit Password—click this option to display the **Edit Password** dialog, where you can change the login password for the DR Series system

NOTE: To change CIFS login credentials, you can use the DR Series system CLI command, **authenticate –set –user** . For details, see the *Dell DR Series System Command Line Reference Guide*.

NOTE: Editing your existing login password is different than resetting your login password. Click **Edit Password** in the **System Configuration** page to edit your login password to reflect any value that meets the system password requirements (for more information, see Modifying the System Password. Click **Reset Password** in the **Login** page to reset your login password to the system default value, which requires you to provide the service tag for your system. For more information, see Resetting the Default System Password.

Shutdown

Shutdown—click this option to display the **Shutdown System** dialog, where you can shut down the DR Series system.

CAUTION: Shutdown powers Off the appliance on which the system software is installed. Once in a powered Off state, you can power it On at its physical location or using an iDRAC configuration to the system.

Reboot

Reboot—click this option to display the **Reboot System** dialog, where you can reboot the DR Series system.

Support Page and Options

Click **Dashboard** → **Support** to display the **Support** page. The **Support** page displays the current support-related information for your system in the **Support Information** pane:

NOTE: The exact number of Ethernet listings (MAC and Speed) displayed depend upon the number and type of Ethernet ports installed in your system. For example, the DR4000 system can support up to four 1–GbE ports or up to two 10–GbE ports, and the DR4100 system can support up to six 1–GbE ports (four internal 1–GbE ports on the network daughter card and two 1–GbE ports on a PCI Express expansion card) or two 10–GbE ports. The following example shows four ports (eth0 through eth3).

- **Product Name**
- **Software Version**
- **Service Tag**
- **Last Diagnostic Run**
- **BIOS Version**

- **MAC Address**
- **iDRAC IP Address**
- **eth0 MAC**
- **eth0 Speed**
- **eth1 MAC**
- **eth1 Speed**
- **eth2 MAC**
- **eth2 Speed**
- **eth3 MAC**
- **eth3 Speed**

In addition, this page provides options for supporting, upgrading, and licensing additional storage for your DR Series system: **Diagnostics**, **Software Upgrade**, and **License**. For more information, see Understanding the Support Page Options.

Understanding the Support Page Options

The **Support** page displayed in the navigation panel provides three important options (**Diagnostics**, **Software Upgrade**, and **License**). These three options allow you to perform the following tasks:

- Generate, download, or delete diagnostics log files
- Upgrade a later version of the DR Series system software
- Install the license file for any added data storage expansion shelf

Diagnostics

Diagnostics—click this option to display the **Diagnostics** page, where the number of diagnostics are listed by file name, size, time, and date that the diagnostics log bundle was generated, the reason the diagnostics log bundle was created, and its status. The **Diagnostics** page provides the **Generate**, **Download**, and **Delete** options.

The diagnostics bundle of log files are used by Dell Support to diagnose system conditions that you report or are detected as issues during DR Series system operations.

NOTE: Click **Select** to identify the diagnostics log file on which you want to perform an action. For example, click **Select** → **Download** to display the **File Download** dialog for the diagnostics log file you selected for downloading.

NOTE: The diagnostics bundles can be generated in two modes: admin-generated and auto-generated. In the latter mode, when a process or service failure is detected, the DR Series system starts collecting system-related information as a background task. Once the collection has completed, the DR Series system generates a system event. If diagnostics bundles are being generated frequently without an administrator request, you may want to contact Dell Support for assistance.

For more information about the **Diagnostics** page and **Diagnostics** service, see Diagnostics Page and Options, and About the Diagnostics Service.

Software Upgrade

Software Upgrade—click this option to display the **Software Upgrade** page, where there are two panes: the **Upgrade File Location** and **Software Information**. The **Software Upgrade** page allows you navigate to and locate the software upgrade file. Once located, click **Start Upgrade** to start the upgrade process, or view the current version and upgrade history for the DR Series system. The **Start Upgrade** page provides the **Reboot** option.

NOTE: When preparing to perform a software upgrade for the DR Series system, the software upgrade file must be downloaded and be locally accessible from the system running the DR Series system GUI.

For more information about system software upgrades, see Software Upgrade Page and Options.

License

License—click this option to display the **License** page, where there are two panes: License File Location and Number of Installed Licenses. The **License** page is where you locate the corresponding license file for the installed data storage expansion shelf.

In the License File Location pane, enter the location on the local disk (or a known network location) where the expansion shelf license file has been downloaded (typically, it is /store/license), or click **Browse...** to navigate to another directory/ folder path location where the license file (license.xml) resides. Once located, click **Install License** to install and validate the license file for the installed data storage expansion shelf.

After installing and validating the license file, the **License** page displays a **License file has been successfully installed** dialog, and the Number of Installed Licenses summary table is updated with the new license file you just installed. The Number of Installed Licenses pane contains a summary table that lists and identifies each installed license by ID, description, entitlement ID, and current status.

For more information about the supported data storage expansion shelf or the licenses needed for an expansion shelf, see Expansion Shelf Licenses and Installing an Expansion Shelf.

Expansion Shelf Licenses

This topic introduces the license required for adding external data storage in the form of Dell MD1200 storage arrays that are referred to as expansion shelf enclosures. Expansion shelf enclosures allow you to add supplemental data storage capacity to support DR Series system operations. The DR Series system supports up to maximum of two enclosures per system, and any expansion shelf enclosure that is added must be equal to or greater than each DR Series system internal drive slot capacity (0–11). Expansion shelf enclosures can be added to the internal data storage to create up to 9, 18, or 27 Terabyte (TB) hard drive capacities, and expansion shelf enclosures can be added in 1 TB, 2 TB, or 3 TB capacities. Licenses define the expansion shelf enclosure size in a license = size format (for example, shelf = 18TB), and licenses are added on a per-shelf basis.

Table 4. Expansion Shelf Capacities in the DR Series System

System/Expansion Shelf Enclosure Size	Maximum Data Storage Capacity Options
600 Gigabyte (GB) expansion shelf	• 9 TB • 18 TB • 27 TB
1 TB expansion shelf	• 9 TB • 18 TB • 27 TB
2 TB expansion shelf	• 18 TB • 27 TB
3 TB expansion	• 27 TB

Licenses

Adding an expansion shelf enclosure requires that you order a license for each enclosure from a Dell Account representative at the time that you order the DR Series system. You can also order this at a later date when you want to add additional external storage to your base DR Series system. To obtain the license, you can download it from the **support.dell.com/** website using your service tag or use an email link from your Dell Account representative.

If you already have a Dell MD1200 storage array, the order process supports licensing for existing hardware that you want to add to a base DR Series system. Each license supports one expansion shelf enclosure, and the system supports

up to two enclosures using the DR Series system service tag. Because the licenses are tied to the system service tag, if the internal drives are moved to another system chassis, this would require a new license. For more information about the expansion shelf enclosures, see "DR Series Expansion Shelf" in DR Series System and Data Operations.

NOTE: The 300 Gigabyte (GB) drive capacity (2.7 TB) version of the DR Series system does not support the addition of expansion shelf enclosures to add external storage to the base system.

Installing an Expansion Shelf License

Make sure that you have located the license for expansion shelf prior to attempting to install and validate it.

To install a license for an expansion shelf for the DR Series system, complete the following:

NOTE: The 300 Gigabyte (GB) drive capacity (2.7 TB) version of the DR Series system does not support the addition of expansion shelf enclosures.

1. In the navigation panel, select **Support** → **License** (or double-click **License**).
   The **License** page is displayed, showing a License File Location pane and a Number of Installed Licenses pane.
2. In the License File Location pane, enter the path where the license file resides (typically, this is /store/license), or click **Browse...** to navigate to the license file location.
3. Click **Install License** and follow all prompts.
   If successful, a **License has been successfully installed** dialog is displayed, and the new license appears in the Number of Installed Licenses pane. The Number of Installed Licenses pane list the total number of installed licenses, and defines each installed license by ID. a brief description, an entitlement ID (license tag), and the status of the license.

4

Configuring the DR Series System Settings

This topic introduces the concept that before you can run any DR Series system operations, you first need to understand the following key tasks:

- how to initialize the system
- how to shut down or reboot the system
- how to manage the system password

Initializing the DR Series system requires that you configure and manage a number of very important system settings.

NOTE: Dell recommends that you use the **Initial System Configuration Wizard** to configure your DR Series system. Changing some of the system settings using the DR Series system GUI (such as bonding, MTU, hostname, IP address, and DNS) can cause issues that may affect your DR Series system GUI access.

For more information about initializing the system, see Initializing the DR Series System.

For more information about shutting down or rebooting the system, see Shutting Down the DR Series System and Rebooting the DR Series System.

For more information about managing the system password, see Managing the DR Series System Password.

Configuring Networking Settings

You can configure the networking settings that were configured using the **Initial System Configuration Wizard** process for the DR Series system in the following panes:

NOTE: For the Ethernet port settings on the NICs, this example only shows Eth0 and Eth1 (depending upon your system configuration, you could have NICs configured with Ethernet port settings in the Eth0–Eth5 range). The DR4000 system supports up to four 1–GbE ports or up to two 10–GbE ports, while the DR4100 system supports up to six 1–GbE or up to two 10–GbE ports. For more information, see Local Console Connection.

- **Hostname**
- **IP Address**
  - Mode (IP address used (static IP or DHCP addressing)
  - Netmask
  - iDRAC IP address
  - System IP address
  - Gateway IP address
- **DNS**
  - Domain Suffix
  - Primary DNS
  - Secondary DNS
- **Bonding**
  - Device

- Mode
- MAC Address
- MTU (maximum transmission unit)
- Bonding Option
- Slave Interfaces

- **Eth0**
  - MAC
  - Maximum Speed
  - Speed
  - Duplex
- **Eth1**
  - MAC
  - Maximum Speed
  - Speed
  - Duplex

To configure new networking settings (or to change from those set using the **Initial System Configuration Wizard**), complete the following:

1. Select **System Configuration** → **Networking**.
   The **Networking** page is displayed. Select settings for hostname, IP Address, DNS, Bonding, or to view the Ethernet port settings (Eth0-Eth3) for the DR Series system.
   - If you need to configure hostname, skip to step 2.
   - If you need to configure IP addressing, skip to step 4.
   - If you need to configure DNS, skip to step 7.
   - If you need to configure bonding, skip to step 10.
   - If you need to configure MTU, skip to step 13.
   -
   -
2. To change the current Hostname, click **Edit Hostname** on the options bar.
   The **Edit Hostname** dialog is displayed.
3. Type a hostname in **Hostname** that meets the following supported character types and length:
   - Alphabetic—allows A-Z, a-z, or a combination of upper and lower case alphabetic characters.
   - Numeric—allows numerals zero (0) through 9.
   - Special characters—allows only the dash (-) character.
   - Length limit—hostnames cannot exceed the maximum length of 19 characters.
   - When satisfied with the new hostname, click **Submit** to set the new hostname for your system.
4. To change the current IP address settings, click **Edit IP Address** on the options bar.
   The **Edit IP Address** dialog is displayed.
5. Enter or modify the following values in the **Edit IP Address** dialog:
   - In **Mode**, select **Static** (to set static IP addressing for your system), or select **DHCP** (to set dynamic IP addressing for your system).

NOTE: To select the **DHCP** mode of IP addressing, select **DHCP**, and click **Submit**. The remaining substeps in this step only need to be completed if you selected the **Static** mode of IP addressing for the DR Series system.

- In **New IP Address**, type an IP address that represents the new IP address for your system.
- In **Netmask**, type an netmask address value that represents your system (the system IP address and netmask identify the network to which your system belongs).
- In **Gateway**, type an IP address for the gateway associated with your system.

6. Click **Submit** to have the DR Series system accept the new values (or click **Cancel** to display the **Networking** page).

   The **Updated IP Address** dialog is displayed when the selection is successful (if you change the static IP address manually, you need to use this IP address in the browser when you log back into the DR Series system).

7. To configure **DNS** settings for your system, click **Edit DNS** on the options bar.

   The **Edit DNS** dialog is displayed.

8. Configure the following values in the **Edit DNS** page:

   - In **Domain Suffix**, type a domain suffix to use (for example, acme.local); this is a required field.
   - In **Primary DNS**, type an IP address that represents the primary DNS server for your system; this is a required field.
   - For **Secondary DNS**, type an IP address that represents the secondary DNS server for your system; this is an optional field.

9. Click **Submit** to have the DR Series system accept the new values (or click **Cancel** to display the **Networking** page).

   The **Updated DNS** dialog is displayed when the selection is successful.

10. To configure **Bonding** settings for your system, click **Edit Bonding** on the options bar.

    The **Edit Bonding** dialog is displayed.

11. Select the Bonding configuration for the system by choosing one of the following options from the **Bonding config** list:

    - **ALB**—configures adaptive load balancing (ALB), which is the default setting.

      NOTE: ALB load balancing does not balance the load properly when your backup servers are on a remote subnet. This is because ALB uses the address resolution protocol (ARP) and ARP updates are subnet-specific. Because this is the case, ARP broadcasts and updates are not sent across the router. Instead, all traffic is sent to the first interface in the bond. To resolve this ARP-specific issue, make sure that your data source systems reside on the same subnet as the DR Series system.

    - **802.3ad**—configures dynamic link aggregation using the IEEE 802.ad standard.

      CAUTION: **If you change the existing bonding setting, the connection to the DR Series system may be lost unless you are sure that the system can accept this bonding type.**

12. Click **Submit** to have the DR Series system accept the new values (or click **Cancel** to display the **Networking** page).

    The **Updated Bonding** dialog is displayed when the selection is successful.

13. To configure a maximum transmission unit (MTU) setting for your system, click **Edit MTU** on the options bar.

    The **Edit MTU** dialog is displayed.

    NOTE: In computer networking, jumbo frames are Ethernet frames with more than 1500 bytes of payload (but in some cases, jumbo frames can carry up to 9000 bytes of payload). Many Gigabit Ethernet switches and Gigabit Ethernet network interface cards support jumbo frames. Some Fast Ethernet switches and Fast Ethernet network interface cards also support jumbo frames.

    Some computer manufacturers use 9000 bytes as the conventional limit for jumbo frame sizes. To support jumbo frames used in an Internet Protocol subnetwork, both the host DR Series system (initiator or source) and the target DR Series system have to be configured for 9000 MTU.

    Consequently, interfaces using a standard frame size and those using the jumbo frame size should not be in the same subnet. To reduce the chance of interoperability issues, network interface cards capable of supporting jumbo frames require specific configurations to use jumbo frames.

To verify that the destination system can support a specific frame size, use the DR Series system CLI command **network --ping --destination <IP address> --size <number of bytes>**.

For more information, contact Dell Support for assistance (for details, see Contacting Dell).

NOTE: Make sure that if you are using any Dell network switches that you take full advantage of the latest switch firmware upgrades and application notes. The application notes provide procedures that assist you in performing switch firmware upgrades and saving configuration files (for complete details, see **support.dell.com/** and navigate to **Drivers and Downloads** for your system type).

14. In **MTU**, type the value you want to set as the maximum.

    NOTE: When setting or changing the MTU value, make sure that you verify that the Ethernet network switch is capable of supporting an MTU size that is equal to or larger than the value you are setting. Any mismatch in MTU values between the clients, Ethernet network switch, and the DR Series system appliance will make it inoperable.

    Dell suggests that you observe standard best practices when deploying jumbo frames in networks, and recommends using jumbo frames with the DR Series system because this frame size typically provides the best performance. However, for networks that do not support jumbo frames, the DR Series system also supports using the standard frame size.

15. Click **Submit** to configure the MTU option for your system (or click **Cancel** to display the **Networking** page).

    The **Updated MTU** dialog is displayed when the selection is successful.

Networking Page and Ethernet Port Values

The **Networking** page displays the currently configured multiple Ethernet ports for the DR Series system in a series of panes. For 1–Gigabit Ethernet (GbE) ports in the DR4000 system this could be Eth0, Eth1, Eth2, and Eth3, and in the DR4100 system this could be Eth0, Eth1, Eth2, Eth3, Eth4, and Eth5. For 10-GbE/10-GbE SFP+ NICs, this means that the two ports are bonded together into a single interface. For example, the DR Series system port configuration is as follows:

- In a 1-GbE NIC configuration: the DR4000 system supports up to four 1–GbE ports, which consists of up to two internal LAN on Motherboard (LOM) ports and two ports on an expansion card that are bonded together. The DR4100 system supports up to six 1–GbE ports, which consists of up to four internal LOM ports on the network daughter card (NDC) and two ports on a PCI Express expansion card.
- In a 10-GbE or 10-GbE SFP+NIC configuration: the DR4000 system supports up to two 10–GbE or 10–GbE SFP+ ports on an expansion card that are bonded together. The DR4100 system supports up to two 10-GbE or 10-GbE SFP+ ports that reside on the NDC that are bonded together.

The ports for bonded NICs display: MAC address, port speed in megabtyes per second (MB/s), maximum speed, and duplex setting. The following example shows Ethernet port values for the four ports in a 1-GbE NIC bonded configuration on a DR4000 system:

Eth0:

- MAC: 00:30:59:9A:00:96
- Speed: 1000Mb/s
- Max Speed: 1000baseT/Full)
- Duplex: Full

Eth1:

- MAC: 00:30:59:9A:00:97
- Speed: 1000Mb/s
- Max Speed: 1000baseT/Full
- Duplex: Full

Eth2:

- MAC: 00:30:59:9A:00:98
- Speed: 1000Mb/s
- Max Speed: 1000baseT/Full
- Duplex: Full

Eth3:

- MAC: 00:30:59:9A:00:99
- Speed: 1000Mb/s
- Max Speed: 1000baseT/Full
- Duplex: Full

Managing the DR Series System Password

You can manage the login password that is used when logging in to the DR Series system in two ways:

- By modifying the existing login password using the **Edit Password** option in the **System Configuration** page. For more information, see Modifying the System Password.
- By resetting the login password to its default value using the **Reset Password** option in the **DR Series System Login** page. For more information, see Resetting the Default System Password.

Modifying the System Password

To configure a new password or to modify an existing password for logging in to the DR Series system, complete the following:

1. In the navigation panel, select **System Configuration**.
   The **System Configuration** page is displayed.
2. Click **Edit Password** on the **System Configuration** page options bar.
   The **Edit Password** dialog is displayed.
3. In **Current password**, type the current password for the system.
4. In **New password**, type the new password that will replace the current system password.
5. In **Confirm password**, retype the new password to confirm this as the new password replacing the existing system password.
6. Click **Change Password** (or click **Cancel** to display the **System Configuration** page).
   If successful, a **Password change was successful** dialog is displayed.

Resetting the Default System Password

To reset the system to use the default password (**St0r@ge!**) for logging in, complete the following:

1. In the **Login** window, click **Reset Password**.
   The **Reset Password** dialog is displayed.
2. In **Service Tag**, type the service tag associated with your system, and click **Reset Password**.

   NOTE: If you are unsure of the service tag associated with your DR Series system, it can be found on the **Support** page (click **Support** in the navigation panel to display the Support Information pane, which displays the service tag).

The **Login** window is displayed, and a **Password has been reset** dialog is displayed.

3. To login using the default password, type **St0r@ge!** , and click **Login**.

   NOTE: After you have reset the login password to its default and logged in to the DR Series system, Dell recommends for security reasons that you create a new unique login password.

Shutting Down the DR Series System

If needed, you can shut down the DR Series system by selecting **Shutdown** in the **System Configuration** page. However, you should fully understand what this action means to system operations before attempting to shut down the system.

CAUTION: Shutdown powers Off the appliance on which the DR Series system software is installed. Once powered Off, you can only power it On again at its physical location, or you must use an iDRAC connection to the DR Series system.

To shutdown your DR Series system, complete the following:

1. In the navigation panel, select **System Configuration**.

   The **System Configuration** page is displayed.
2. Click **Shutdown** on the **System Configuration** page options bar.

   The **Shutdown confirmation** dialog is displayed.
3. Click **Shutdown System** to proceed with shutting down the system (or click **Cancel** to return to the **System Configuration** page).

Rebooting the DR Series System

If needed, you can reboot the DR Series system by selecting the **Reboot** option in the **System Configuration** page. To reboot your system:

1. In the navigation panel, select **System Configuration**.

   The **System Configuration** page is displayed.
2. Click **Reboot** on the **System Configuration** page options bar.

   The **Reboot System** confirmation dialog is displayed.
3. Click **Reboot System** to proceed with rebooting the system (or click **Cancel** to return to the **System Configuration** page).

   The **System has successfully rebooted** dialog is displayed after rebooting (system reboot may take up to 10 minutes to complete).

Configuring Compression Level Settings

You can configure the data compression that you want used on all incoming data to be backed up and deduplicated by the DR Series system.

NOTE: This is a global compression level setting for your system. After making a compression level setting change, the change only affects the new incoming data (which is written using the new setting). All existing data on the system remains in the setting in effect when it ingested (it is not rewritten using the new compression level setting).

Configure the compression level setting on the **Compression Level** page by selecting from the following choices:

- **Fast**—(default) when selected, system backups are performed faster than if **Best** was selected. However, using this setting results in a corresponding reduction in space savings.

- **Best**—when selected, system backups gain the highest overall space savings. However, using this setting results in a corresponding longer time to complete the backup process.

To configure the **Compression Level** setting for your system, complete the following:

1. Select **Storage** → **Compression Level**.
   The **Compression Level** page is displayed.
2. To configure a **Compression Level** setting, click **Edit** on the options bar.
   The **Compression Level Settings** dialog is displayed.
3. In the **Compression Level** list, choose the compression level type you want to use for all incoming data: **Fast** or **Best**.
4. Click **Set Compression Level** to configure the system using this setting (or click **Cancel** to display the **Compression Level** page).
   The **Updated Compression** dialog is displayed when the selection is successful.

   NOTE: The compression level setting you configure for your system is a global setting. Once you have made a compression level setting change, the change will only affect the new incoming data (which is written using the new setting). All existing data on the system remains in the previous setting that was in effect when it ingested (it is not rewritten using the new compression level setting). The checksum is performed on the new incoming data so changing the compression settings will not affect the storage capacity of the system in any negative way.

Configuring Active Directory Settings

You need to configure the Active Directory setting to direct your DR Series system to join or leave a domain that contains a Microsoft Active Directory Service (ADS). To join an ADS domain, complete steps 1 through 4 in the following procedure (to leave an ADS domain, skip to step 5). When you join the DR Series system to an ADS domain, this disables the Network Time Protocol (NTP) service and instead uses the domain-based time service.

To configure the DR Series system for a domain using ADS, complete the following:

1. Select **System Configuration** → **Active Directory**.
   The **Active Directory** page is displayed.

   NOTE: If you have not yet configured ADS settings, an informational message is displayed in the **Settings** pane in the **Active Directory** page.
2. Click **Join** on the options bar.
   The **Active Directory Configuration** dialog is displayed.
3. Type the following values in the **Active Directory Configuration** dialog:
   - In **Domain Name (FQDN)**, type a fully qualified domain name for the ADS; for example, **AD12.acme.com**. *(This is a required field.)*

     NOTE: Supported domain names are limited to 64 characters in length and can only consist of a combination of A-Z, a-z, 0-9, and three special characters: a dash (-), a period (.), and an underscore (_).
   - In **Username**, type a valid user name that meets the user name guidelines for the ADS. *(This is a required field.)*

     NOTE: Supported user names are limited to 64 characters in length and can only consist of a combination of A-Z, a-z, 0-9, and three special characters: a dash (-), a period (.), and an underscore (_).
   - In **Password**, type a valid password that meets the password guidelines for the ADS. *(This is a required field.)*

– In **Org Unit**, type a valid organizational name that meets the organization name guidelines for the ADS. *(This is an optional field.)*

4. Click **Join Domain** to configure your system with these ADS settings (or click **Cancel** to display the **Active Directory** page).

   The **Successfully Configured** dialog is displayed when successful.

   NOTE: If you configure CIFS container share paths, these will be displayed in a CIFS Container Share Path pane in the **Active Directory** page.

5. To leave an ADS domain, click **Leave** in the **Active Directory** page.

   The **Active Directory Configuration** dialog is displayed.

6. Leaving the configured ADS domain requires that you enter the following:
   a) In **Username**, enter a valid user name for the ADS domain.
   b) In **Password**, enter a valid password for the ADS domain.

7. Click **Leave Domain** to direct your DR Series system to leave the ADS domain (or click **Cancel** to display the **Active Directory** page).

   The **Successfully Configured** dialog is displayed when successful.

Configuring Local Workgroup Users Settings

You need to configure settings to create a local workgroup of CIFS authenticated users. This capability lets you create a local workgroup (Local Workgroup Users) to which you can add new users, edit existing users, or delete users from the workgroup.

To configure the DR Series system for a Local Workgroup Users, complete the following:

1. Select **System Configuration** → **Local Workgroup Users**.

   The **Local Workgroup Users (CIFS)** page is displayed.

2. To create a new CIFS user in this local workgroup of users, click **Create** on the option bar.

   The **Create a local workgroup user for CIFS authentication** dialog is displayed.
   a) In **User Name**, enter a valid user name for this user.
   b) In **Password**, enter a valid password for this user.
   c) Click **Add CIFS User** to create the new user in the Local Workgroup Users for the system (or click **Cancel** to return to the **Local Workgroup Users (CIFS)** page).

   An **Added CIFS user** confirmation dialog is displayed when successful.

3. To edit an existing CIFS user in this local workgroup of users, click **Select** to identify the user in the Local Workgroup Users summary table that you want to modify, and click **Edit** in the option bar.

   The **Edit a local workgroup user for CIFS authentication** dialog is displayed.
   a) In **Password**, enter a different valid password for this user.

      You cannot modify the **User Name** for this user, you can only modify the **Password**. If you want a user with a different **User Name**, you must delete this user and create a new user with the desired **User Name**.
   b) Click **Edit CIFS User** to modify the password for existing user in the Local Workgroup Users for the system (or click **Cancel** to return to the **Local Workgroup Users (CIFS)** page).

4. To delete an existing CIFS user from the local workgroup of users, click **Select** to identify the user in the Local Workgroup Users summary table that you want to delete, and click **Delete** in the option bar.

   The **Delete user** confirmation dialog is displayed.
   a) Click **OK** to delete the selected user from the Local Workgroup Users summary table (or click **Cancel** to return to the **Local Workgroup Users (CIFS)** page).

   A **Deleted CIFS user** confirmation dialog is displayed when successful.

Configuring Email Alert Settings

You can create and manage recipient email addresses for users to which you want to send DR Series system email alerts. The **Email Alerts** page contains options that let you add new, edit or delete existing recipient email addresses, and send a test message to the recipient email addresses listed in the **Recipient Email Address** pane.

NOTE: The **Email Alerts** page contains all the options you need for managing the recipient email addresses and testing the send message capability.

Adding a Recipient Email Address

To configure and add a new recipient email address, complete the following:

1. Select **System Configuration** → **Email Alerts.**
   The **Email Alerts** page is displayed.
2. Click **Add** on the options bar.
   The **Add Recipient Email Address** dialog is displayed.
3. In **Email Address**, type a valid email address using the address format that your email system supports.
4. Click **Submit** to configure the recipient email address (or click **Cancel** to display the **Email Alerts** page).
   The **Email Alerts** page is displayed, and an **Added email recipient** dialog is displayed when successful.
5. To create additional recipient email addresses, repeat steps 2 through 4.

NOTE: For information about sending an email alerts message to test one or more email recipients, see Sending a Test Message.

Editing or Deleting a Recipient Email Address

To edit or delete an existing recipient email address:

1. Select **System Configuration**→ **Email Alerts**.
   The **Email Alerts** page is displayed.

   NOTE: To edit or delete an existing recipient email address, you must first click **Select** in the Recipient Email Address pane to indicate the address that you want to edit or delete. To edit an existing email address, proceed to step 2, or to delete an existing email address, skip to step 4. For more information about adding email recipients, see Adding a Recipient Email Address.
2. To edit an existing recipient email address, click **Select** to indicate the recipient email address entry that you want to change, and click **Edit** on the options bar.
   The **Edit Recipient Email Address** dialog is displayed.
3. Modify the existing email address you selected as needed, and click **Submit**.
   The **Email Alerts** page is displayed, and a **Successfully updated email recipient** dialog is displayed when successful. To edit additional recipient email addresses, repeat steps 2 and 3.
4. To delete an existing recipient email address, click **Select** to indicate the recipient email address entry that you want to delete, and click **Delete** on the options bar.
   The **Delete Confirmation** dialog is displayed.
5. Click **OK** to delete the selected email recipient address (or click **Cancel** to display the **Email Alerts** page).

The **Email Alerts** page is displayed, and a **Deleted email recipient** dialog is displayed when successful. To delete additional recipient email addresses, repeat steps 4 and 5.

Sending a Test Message

The DR Series system provides the means for sending test messages to all configured recipient email addresses. This process lets you manage the sending of system alert messages, at which point you can verify that all of the configured email recipients received these messages.

NOTE: If needed, ensure that you have a configured email relay host. For more information about email relay hosts, see Adding an Email Relay Host.

1. Select **System Configuration** → **Email Alerts**.
   The **Email Alerts** page is displayed.
2. Click **Send Test Message** on the options bar.
   The **Send Test Email** confirmation dialog is displayed.
3. Click **OK** (or click **Cancel** to display the **Email Alerts** page).
   The **Email Alerts** page is displayed, and a **Successfully sent email** dialog is displayed when successful.
4. Verify that all of the intended recipient email addresses received the test email.

Configuring Administrator Contact Information

You can configure the administrator contact information to identify the person who is actively managing or responsible for your DR Series system acting as its administrator. To do this, enter contact information for the administrator on the **Administrator Contact Information** page using the **Edit Contact Information** option.

In the navigation panel on the **Dashboard** page, click **System Configuration** → **Admin Contact Info** to display the **Administrator Contact Information** page.

For more information about contact information for the administrator, see Editing Administrator Contact Information, and Adding Administrator Contact Information.

The following information categories are displayed in the **Contact Information** and **Notification** panes on the **Administrator Contact Information** page, and this is information sent with all system alert emails:

- **Contact Information**
  - Administrator Name
  - Company Name
  - Email
  - Work Phone
  - Comments
- **Notification**
  - Status of **Notify me of DR4000 appliance alerts** check box (enabled or disabled)
  - Status of **Notify me of DR4000 software updates** check box (enabled or disabled)

Adding Administrator Contact Information

To configure contact information for the system administrator, complete the following:

1. Select **System Configuration** → **Admin Contact Info**.

The **Administrator Contact Information** page is displayed.

2. Click **Add Contact Information** on the options bar.
   The **Add Administrator Contact Information** dialog is displayed.
3. In **Administrator Name**, type the name of the administrator for this appliance.
4. In **Company Name**, type the company name associated with the administrator.
5. In **Email**, type the email address of the administrator (using the email address format that your email system supports).
6. In **Work Phone**, type the telephone number associated with the administrator.
7. In **Comments**, type some information or add comments that uniquely identify this administrator.
8. Click the **Notify me of DR 4000 appliance alerts** check box to be notified about system alerts.
9. Click the **Notify me of DR 4000 software updates** check box to be notified about system software updates.
10. Click **Submit** (or click **Cancel** to display the **Administrator Contact Information** page).
    The **Administrator Contact Information** page is displayed, and an **Updated administrator contact information** dialog is displayed when successful.

Editing Administrator Contact Information

To edit the contact information for an existing system administrator, complete the following:

1. Select **System Configuration→ Admin Contact Info**.
   The **Administrator Contact Information** page is displayed.
2. Click **Edit Contact Info** on the options bar.
   The **Edit Administrator Contact Information** dialog is displayed.
3. Modify the administrator contact information as needed in the corresponding information fields.
4. Select the **Notify me of DR Series appliance alerts** check box to choose this option (or click to deselect this option if selected).
5. Select the **Notify me of DR Series software updates** check box to choose this option (or click to deselect this option if selected).
6. Click **Submit** (or click **Cancel** to display the **Administrator Contact Information** page).
   The **Administrator Contact Information** page is displayed, and an **Updated administrator contact information** dialog is displayed when successful.

Configuring an Email Relay Host

If needed, you can configure an external email relay host to serve your DR Series system if the network email system requires one. The email relay host is typically an external mail server that relays any email alerts from the DR Series system to each of the designated recipient email addresses.

To do this on the **Email Relay Host** page, click **Add Relay Host** to define a new email relay host (or to edit an existing email relay host, click the **Edit Relay Host**) on the options bar. For more information on editing an existing email relay host, see Editing an Email Relay Host.

Adding an Email Relay Host

To configure a new email relay host for your DR Series system, complete the following:

NOTE: To edit an existing email relay host, see Editing an Email Relay Host.

1. Select **System Configuration** → **Email Relay Host**.
   The **Email Relay Host** page is displayed.
2. Click **Add Relay Host** on the options bar.
   The **Add Relay Host** dialog is displayed.
3. In **Relay Host**, type the hostname or IP address of an external mail server that will act as the email relay host for your DR Series system.
4. Click **Submit** (or click **Cancel** to display the **Email Alerts** page).
   The **Email Relay Host** page is displayed, and an **Updated external email server information** dialog is displayed when successful.
5. Send a test message to verify that the email relay host is working properly.
   For more information, see Sending a Test Message.
6. Verify that all of the intended recipient email addresses received the test email.

Editing an Email Relay Host

To edit an existing email relay host for your DR Series system, complete the following:

1. Select **System Configuration**→ **Email Relay Host**.
   The **Email Relay Host** page is displayed.
2. Click **Edit Relay Host** on the options bar.
   The **Edit Relay Host** dialog is displayed.
3. In **Relay Host**, modify the email relay hostname or IP address of the external mail server as needed.
4. Click **Submit** (or click **Cancel** to display the **Email Alerts** page).
   The **Email Relay Host** page is displayed, and an **Updated external email server information** dialog is displayed when successful.

Configuring System Date and Time Settings

If you need to configure or manage the date and time settings used by your system that synchronize it with other DR Series systems or clients running in your domain, navigate to the **Date and Time** page, and click **Edit**. The **Date and Time** page displays a Settings pane that contains the following date and time-related settings (by default, the system has the following date and time settings as default values in an initial system startup):

- **Mode**—select from two types: Manual and Network Time Protocol (NTP).

  NOTE: Dell recommends using NTP when the DR Series system is part of a workgroup and not part of a domain. When the DR Series system is joined to a domain, such as the Microsoft Active Directory Services (ADS) domain, NTP is disabled and the DR Series system uses the domain time.
- **Time Zone**—when in NTP mode, select from a list of time zone options based on Greenwich Mean Time (GMT); for example, GMT-8:00, Pacific Time (US and Canada).
- **NTP Servers**—when in NTP mode, select from an Internet pool of NTP servers (you can define up to three NTP servers) when using the NTP mode. If this setting is not visible in the Settings pane, verify that the **Mode** indicates it is joined to an Active Directory Services (ADS) domain. When joined to a domain, NTP is disabled for the DR Series system.
- **Set Date and Time**—when in Manual mode, click the calendar icon, and configure the date and time by making month, day, and time in a 24-hour time format selections. Use the controls on the calendar to select the month, the day of the month, and the hours and minutes using the slider controls. To set the current time, click **Now**. When done with setting your date and time values, click **Done** (and the time appears for example, as 12/12/12 14:05:45). When all date and time settings are configured, click **Submit** for the DR Series system to accept the new values.

NOTE: System synchronization is critical for proper data archiving and replication service operations.

By using the NTP mode, you synchronize your system clock whereby NTP ensures that your system has a reliable time stamp. This is critical for successful file exchanges, network log coordination and validation, and resource access requests within a workgroup.

NOTE: Dell recommends that you use the NTP mode to ensure better replication service operations when part of a workgroup. You can set or modify existing date and time settings for your DR Series system by using the **Edit** option in the **Date and Time** page. However, the NTP service is disabled when you join a domain, at which point the domain time management is used and you cannot enable NTP.

Editing System Date and Time Settings

To modify the default time and date settings for your DR Series system, complete the following:

1. Select **System Configuration** → **Date and Time**.
   The **Date and Time** page is displayed.
2. Click **Edit** on the options bar.
   The **Edit Date and Time** dialog is displayed.

   NOTE: If the DR Series system is joined to a Microsoft Active Directory Services (ADS) domain, the **Edit** option will be disabled (grayed out) and the **Mode**, **Time Zone**, or **Date and Time** values cannot be changed in the Settings pane. This is because whenever a DR Series system is joined to a domain, the Network Time Protocol (NTP) is disabled and the DR Series system uses the domain-based time service. NTP is used in the **Mode** setting when the DR Series system is part of a workgroup and not joined to a domain. To be able to modify or edit any of the Settings pane values when the DR Series system is joined to an ADS domain, you would first need to leave the ADS domain before you could modify any of the date and time settings. For more information, see Configuring Active Directory Settings.
3. In **Mode**, select either **Manual** or **NTP**.
   If you select **Manual**, continue on with the tasks in step 3, and then complete steps 4 and 5.
   If you select **NTP**, skip to step 6, and complete it and step 7.
   - Select **Manual**.
     The **Edit Date and Time** dialog is displayed.
   - Click the **Time Zone** drop-down list and choose the desired time zone.
   - Click the **Calendar** icon (adjacent to **Set Date and Time**), and select the desired day in the month (the system prevents the selection of unsupported days).
   - Adjust the **Hour and Minute** sliders to the desired time (or click **Now** to set the date and time to be the current date and time in hours and minutes).
4. Click **Done**.
   The **Edit Date and Time** dialog is displayed with your new settings.
5. Click **Submit** (or click **Cancel**).
   The **Date and Time** page is displayed, and a **Disabled NTP service** dialog is displayed when successful.
6. Select **NTP**.
   The **Edit Date and Time** dialog is displayed.
   - Click the **Time Zone** drop-down list and select the desired time.
   - Edit or revise the NTP servers as desired (you are limited to selecting only three NTP servers).
7. Click **Submit** (or click **Cancel**).

The **Date and Time** page is displayed, and an **Enabled NTP service** dialog is displayed when successful (and this was your selected mode).

Creating Containers

After initialization, the DR Series system contains a single default container named **backup**. Containers function like a shared file system, which can be assigned a connection type of **None** (to be defined later), **NFS/CIFS**, or **OST** (OpenStorage Technology). Containers can then be accessed using NFS, CIFS, or OST.

If needed, you can also create additional system containers for storing your data. For more information about creating a storage container or specific connection type containers, see Creating Storage Containers, Creating an NSF or CIFS Connection Type Container, or Creating an OST Connection Type Container.

Configuring Share-Level Security

The DR Series system supports setting up share-level permissions for CIFS shares using the standard Microsoft Windows administrative tool, Computer Management. Computer Management is a component that is built into the Microsoft System 7, Vista, and XP operating systems.

NOTE: Any user that is part of BUILTIN\Administrators can edit ACLs on CIFS shares. The local DR Series system administrator is included in the BUILTIN\Administrators group. To add additional domain groups to the BUILTIN \Administrators group, you can use the Computer Manager tool on a Windows client to connect to the DR Series system as Domain administrator and add any groups you want. This capability allows users other than the Domain administrator to modify an ACL as needed.

This administrative tool lets you control access to shares and also configure read-only or read-write access to user groups or individual users within the Active Directory Service (ADS) when joined to an ADS domain.

To implement share-level security on a DR Series system that has been joined to an ADS domain, make sure that you have mapped a drive on the DR Series system using an account with DOMAIN\Administrator credentials (or by using an account that is equivalent to a domain administrator). For more information about joining to an ADS domain, see Configuring Active Directory Settings.

NOTE: If you do not use an account with sufficient privileges, you will not be able to see the shares or you may experience other problems.

1. Click **Start** → **Control Panel** → **Administrative Tools** → **Computer Management**.
   The **Computer Management** page is displayed.
2. Click **Action** → **Connect to another computer...** .
   The **Select Computer** dialog is displayed.
3. Click **Another computer**, type the hostname or IP address for this DR Series system, and click **OK**.
   The **Computer Management** page is displayed with the designated DR Series system listed in the left pane.
4. Click **System Tools**, and click **Shared folders**.
   The **Shares**, **Sessions**, and **Open Files** folders are displayed in the main pane of the **Computer Management** page.
5. Click **Shares** to display a list of the shares managed by the DR Series system.
6. Right-click on the share of interest, and select **Properties**.
   The specified share **Properties** page is displayed.
7. Click the **Share Permissions** tab in the specified share **Properties** page.
   The **Share Permissions** view in the **Properties** page is displayed.
8. To remove existing access permissions to the share, or add additional groups or user that can access the share, complete the following:

- To add access for a new group or user, click **Add...** to display the **Select Users or Groups** dialog.
- Click **Object Types...**, choose the object types you want to select (**Built-in security principals**, **Groups**, or **Users**), and click **OK**.
- Click **Locations...** and define the root location from which to begin your search, and click **OK**.
- In the **Enter the object names to select** list box, enter any object name(s) you want to find.

  NOTE: You can search for multiple objects by separating each name with a semicolon, and by using one of the following syntax examples: DisplayName, ObjectName, UserName, ObjectName@DomainName, or DomainName\ObjectName.
- Click **Check Names** to locate all matching or similar object names that are listed in the **Enter the object names to select** list box, by using the object types and directory locations you selected.

9. Click **OK** to add the object to the **Group or user names** list box.
10. In the Permissions pane for the selected object, select the **Allow** or **Deny** check box to configure the following permissions:
    - Full Control
    - Change
    - Read
11. Click **OK** to save the selected share permission settings associated with the selected object.

5

Managing DR Series Storage Operations

This topic introduces the concept of using the DR Series system to manage all of your storage and replication operations. Storage operations can include tasks such as creating new containers, managing or deleting existing containers, moving data into containers, and displaying current container statistics.

Replication operations can include such tasks as creating new replication relationships, managing or deleting existing replication relationships, starting and stopping replication, setting a replication bandwidth limit per host, displaying current replication statistics, and setting a Replication schedule.

Managing Container Operations

This topic introduces the concept of using the DR Series system to manage all of your data storage and replication operations. Data storage operations can include tasks such as creating new containers, managing or deleting existing containers, moving data into containers, and displaying current container statistics. Replication operations can include such tasks as creating new replication relationships, managing or deleting existing replication relationships, starting and stopping replication, setting a replication bandwidth limit per host, displaying current replication statistics, and setting a Replication schedule.

Creating Storage Containers

By default, the DR Series system provides a container named **backup** for your use after you complete the basic system configuration and initialization process. You can also create additional containers to store your data as needed.

NOTE: The DR Series system does not support creating container names that begin with a 0 (zero). In addition, many of the DR Series system GUI and CLI operations will not work when a container name begins with a 0.

Containers function like a shared file system that can be accessed using the following connection types:

- **NFS/CIFS**
- **NFS**
- **CIFS**
- **OST** (OpenStorage Technology)
- **None** (an unassigned connection type)

Choosing the **None** or unassigned connection type lets you create containers that can be configured later as needed. To modify a container configured with a **None** connection type, select the container, click **Edit**, and start configuring it as desired.

Creating an NFS or CIFS Connection Type Container

To create an NFS or a CIFS connection type container, complete the following:

1. Select **Storage** → **Containers**.
   The **Containers** page is displayed, which includes a Containers summary table listing all existing containers.
2. Click **Create**.
   The **Create New Container** dialog is displayed.

3. In **Container Name**, type the name of the container.

   Container names cannot exceed 32 characters in length, and can be composed of any combination of the following characters:

   NOTE: The DR Series system does not support the use of the following special characters in container names: /, #, or @.

   - A-Z (uppercase letters)
   - a-z (lowercase letters)
   - 0-9 (numbers)
   - dash (-) or underscore (_) special characters

4. In **Marker Type**, select from the following choices: **None**, **Auto**, **CommVault**, **Networker**, **TSM**, or **ARCserve**.

   If you select the **Auto** marker type, this will enable all marker types to be detected. As a best practice, if you have only one type of DMA with traffic directed to a container, it is best to select the corresponding marker type (for example, **CommVault**). Conversely, as a best practice, if you have traffic from a DMA that is not one of the supported marker types, it is best to disable marker detection for the container by selecting the **None** marker type.

5. In **Connection Type**, select **NFS/CIFS**.

   This displays the following in the NFS and CIFS panes:

   - NFS access path: <*system name*>/containers/<*container name*>
   - CIFS share path: <*system name*>\<*container name*>

   NOTE: To create an NFS connection type, skip to step 6. To create a CIFS connection type, skip to step 10.

6. To select an **NFS** connection type, click **Enable NFS** in the NFS pane.

   The **Client Access**, **NFS Options**, and **Map root to** panes are displayed, and is where you configure this container to use NFS to backup Unix or Linux clients.

7. In the **Client Access** pane, define a specific NFS client (or all clients) that can access the NFS container or manage clients who can access this container:

   - To allow open access for all clients to the NFS container you create, select **Open Access (all clients have access)**. When you select this setting, this action removes the **Add client (IP or FQDN Hostname)** and **Clients** text boxes. Select this check box *only* if you want to enable access for all clients to this NFS container.
   - To define a specific client that can access the NFS container you create, type the IP address (or its FQDN hostname) in the **Add clients (IP or FQDN Hostname)** text box, and click **Add**. The "added" client appears in the **Clients** list box.
   - To delete an existing client from the NFS **Clients** list box, select the IP address (or FQDN hostname) of the client you want to delete, and click **Remove**. The "deleted" client disappears from the list box.

8. In the **NFS Options** pane, define which NFS options to use for the client, by selecting from the NFS Options choices: **rw** (allows read-write access), **ro** (allows read-only access), or **insecure** (allows for replies being made to requests before the changes in the request are committed to disk).

   NOTE: The DR Series system always commits writes to NVRAM first before committing any changes to disk.

9. In the **Map root to** pane, select the user level you want mapped to this container from one of the following options from the drop-down list:

   - **nobody** represents a user on the system without root access permissions
   - **root** represents a remote user with root access to read, write, and access files on the system
   - **administrator** represents the system administrator

NOTE: The DR Series system administrator that manages the system has a different set of privileges than does the CIFS administrator user. Only the DR Series system administrator can change the password for the CIFS administrator user. To change the password that allows access for the CIFS administrator user, use the **authenticate --set --user administrator** commands. For more information, see the *Dell DR Series System Command Line Reference Guide*.

10. To select a **CIFS** connection type, click **Enable CIFS** in the CIFS pane.

    The **Client Access** pane is displayed, which allows you to configure this container to use CIFS to backup Microsoft (MS) Windows clients.

11. In the **Client Access** pane, define a specific CIFS client (or all clients) that can access the CIFS container or manage clients who can access this container:

    - To allow open access for all clients to the CIFS container you created, select **Open Access (all clients have access)**. When you select this setting, this action removes the **Add clients (IP or FQDN Hostname)** and **Clients** text boxes. Select this check box *only* if you want to enable access for all clients to this CIFS container.
    - Type the IP address (or its FQDN hostname) in the **Add clients (IP or FQDN Hostname)** text box, and click **Add**. The "added" client appears in the **Clients** list box.
    - To delete an existing client from the **Clients** list box, click to select the IP address (or FQDN hostname) of the client you want to delete, and click **Remove**. The "deleted" client disappears from the list box.

12. Click **Create a New Container** (or click **Cancel** to display the **Containers** page).

    The **Containers** page is displayed, along with a **Successfully Added** dialog. The list of containers in the Containers summary table is now updated with your new container.

Creating an OST Connection Type Container

To create an OST connection type container, complete the following:

1. Select **Storage** → **Containers**.

   The **Containers** page is displayed showing all existing containers.

2. Click **Create**.

   The **Create New Container** dialog is displayed.

3. In **Container Name**, type the name of the container.

   Container names cannot exceed 32 characters in length, and can be composed of any combination of the following characters:

   - A-Z (uppercase letters)
   - a-z (lowercase letters)
   - 0-9 (numbers)
   - dash (-) or underscore (_) special characters

   NOTE: The DR Series system does not support the use of the following special characters in container names: /, #, or @.

4. In **Marker Type**, select from the following choices: **None**, **Auto**, **CommVault**, **Networker**, **TSM**, or **ARCserv**.

   If you select the **Auto** marker type, this will enable all marker types to be detected. As a best practice, if you have only one type of DMA with traffic directed to a container, it is best to select the corresponding marker type (for example, **CommVault**). Conversely, as a best practice, if you have traffic from a DMA that is not one of the supported marker types, it is best to disable marker detection for the container by selecting the **None** marker type.

5. In **Connection Type**, select **OST** for this type of container to create.

   The **OST** pane is displayed, which allows you to configure this container to use OST (OpenStorage Technology) to backup NetBackup and Backup Exec media servers.

6. In **Capacity**, select one of the following options allowed per container:

- **Unlimited**: this defines the allowed amount of incoming raw data per container (based on the physical capacity of the container).
- **Size**: this defines a set limit in Gibibytes (GiB) for incoming raw data allowed per container.

7. Click **Create a New Container** (or click **Cancel** to display the **Containers** page).

   After creating the new container, the **Containers** page is displayed and includes a **Successfully Added** dialog. The list of containers in the Containers summary table is updated with your new container (and its new status is reflected as N/A in the Replication column of this table).

Creating an Unassigned Connection Type Container

To create an unassigned container in the DR Series system without a defined connection type (**None**), complete the following:

NOTE: The DR Series system allows you to create a container without configuring it with a specific connection type. When you are ready to configure an unassigned container at a later date, select it in the Containers summary table, click **Edit**, and configure it with the desired connection type.

1. Select **Storage** → **Containers**.

   The **Containers** page is displayed showing all existing containers.

2. Click **Create**.

   The **Create New Container** dialog is displayed.

3. In **Container Name**, type the name of the container.

   Container names cannot exceed 32 characters in length, and can be composed of any combination of the following characters:

   NOTE: The DR Series system does not support the use of the following special characters in container names: /, #, or @.

   - A-Z (uppercase letters)
   - a-z (lowercase letters)
   - 0-9 (numbers)
   - dash (-) or underscore (_) special characters

4. In **Marker Type**, select from the following choices: **None**, **Auto**, **CommVault**, **Networker**, **TSM**, or **ARCserv**.

   If you select the **Auto** marker type, this will enable all marker types to be detected. As a best practice, if you have only one type of DMA with traffic directed to a container, it is best to select the corresponding marker type (for example, **CommVault**). Conversely, as a best practice, if you have traffic from a DMA that is not one of the supported marker types, it is best to disable marker detection for the container by selecting the **None** marker type.

5. To create a container with an unassigned connection type, select **None** to create a container for configuration at a later time or to disable any specific marker type for the container.

6. Click **Create a New Container** (or click **Cancel** to display the **Container Summary** page).

   After creating a new container, the **Containers** page is displayed and displays a **Successfully Added** dialog. The list of containers in the Containers summary table is updated with your new unassigned container.

Editing Container Settings

To modify any of the settings for an existing container, complete the following:

1. Select **Storage**→ **Containers**.

   The **Containers** page is displayed, and lists all current containers.

2. Click **Select** to identify the container in the list that you want to modify, and click **Edit**.

The **Edit Container** dialog is displayed.

3. Modify the marker type options for the selected container as needed (containers support **None**, **Auto**, **CommVault**, **Networker**, **TSM** (Tivoli Storage Manager), or **ARCserve**.

   If you select the **Auto** marker type, this will enable all marker types to be detected. As a best practice, if you have only one type of DMA with traffic directed to a container, it is best to select the corresponding marker type (for example, **CommVault**). Conversely, as a best practice, if you have traffic from a DMA that is not one of the supported marker types, it is best to disable marker detection for the container by selecting the **None** marker type.

4. Modify the connection type options for the selected container as needed (containers support **None**, **NFS/CIFS**, and **OST**).

   - If you want to modify an existing NFS/CIFS, NFS, or CIFS connection type container settings, see the NFS/CIFS, NFS-only, and CIFS-only options available in Creating an NSF or CIFS Connection Type Container, and make the corresponding changes.
   - If you want to modify the existing OST connection type container settings, see the options available in Creating An OST Connection Type Container, and make the corresponding changes.
   - If you want to modify the existing unassigned (None) connection type container settings, see the options available in Creating An Unassigned Connection Type Container, and make the corresponding changes.

   NOTE: If you select **Open Access** in the **Client Access** pane, the **Add clients (IP or FQDN Hostname)** and **Clients** panes are hidden and you cannot create or modify these options.

   NOTE: The DR Series system always commits writes to NVRAM first before committing any changes to disk.

   NOTE: The DR Series system administrator that manages the DR Series system has a different set of privileges than does the CIFS administrator user. Only the DR Series system administrator can change the password for the CIFS administrator user. To change the password that allows access for the CIFS administrator user, use the DR Series system CLI **authenticate --set --user administrator** command. For more information, see the *Dell DR Series System Command Line Reference Guide*.

5. Once the container type settings have been modified, click **Modify this Container** (or click **Cancel** to display the **Containers** page).

   The **Successfully updated container** dialog is displayed. The list of containers in the Containers summary table is updated with the newly modified container.

Deleting Containers

Before deleting a container, Dell recommends that you first carefully consider whether or not you need to preserve the data in the container. To delete an existing container that contains data, complete the following:

CAUTION: Before deleting any DR Series container that contains deduplicated data, Dell recommends that you take steps to preserve this data using another means of long-term retention. Once a container is deleted, the deduplicated data cannot be retrieved. This and later releases of the DR Series system allow you to delete any specified container and all its contents in one operation.

1. Select **Storage** → **Containers**.

   The **Containers** page is displayed, and lists all current containers.

2. Click **Select** to identify the container you want to delete, and click **Delete**.

   A **Delete Confirmation** dialog is displayed, which prompts you about the specific container by name that you selected to delete.

3. Click **OK** in the **Delete Confirmation** dialog (or click **Cancel** to display the **Containers** page).

   The **Successfully removed container** dialog is displayed. The list of containers in the Containers summary table is updated and no longer displays the deleted container.

Moving Data into a Container

To move data into an existing DR Series system container, complete the following:

1. Click **Start** → **Windows Explorer** → **Network** .
   The **Network** page is displayed, which lists all current computers.
2. In the browser **Address bar**, click **Network** to select your DR Series hostname or IP address.
   The **Network** page is displayed, which lists all current storage and replication containers.

   NOTE: However, if your DR Series system is not listed, you can enter its hostname or IP Address preceded by "https://" and followed by the container name in the **Address bar** to access it (for example in this format, https://10.10.20.20/container-1). The DR Series system only supports the Hypertext Transfer Protocol Secure (HTTPS) form of IP addressing.
3. Move data from the source location to the destination container using your regular DMA or backup application process.

   NOTE: If any file ingested by the DR Series system by a DMA or backup application is renamed or deleted without using the DMA or backup application's process, the corresponding catalog must be updated accordingly. Failure to do so may prevent the DMA or backup application from being able to access the data.
4. Verify that the data recently moved now resides in the destination container (or click **Dashboard** → **Statistics: Container**, select the destination container in the **Container Name** drop-down list, and view the following information panes for recent container activity:
   - **Backup Data**
   - **Throughput**
   - **Connection Type**
   - **Replication**

Displaying Container Statistics

To display the current statistics for an existing container that stores your data, complete the following:

NOTE: An alternate method to display statistics for any current container is to select that container by name in the **Container Name** drop-down list in the **Statistics: Container** page (**Dashboard Statistics: Container**).

1. Select **Storage** → **Containers**.
   The **Containers** page is displayed, and the Containers summary table lists all of the current containers in the system.
2. Click **Select** to identify the container to display, and click **Display Statistics** in the options bar.
   The **Statistics: Container** page is displayed which shows the current backup data (number of active files and active bytes ingested in the Backup Data pane), and read and write throughput (in the Throughput pane). The system polls for and updates the displayed statistics every 30 seconds.

   NOTE: To display statistics for another container, select that container by name in the **Container Name** drop-down list.

   This page also displays the marker type and connection type for the selected container, and the displayed statistics depends upon the connection type container. For more information, see Statistics: Container Page, Connection Type Pane, and Monitoring Container Statistics.

   In addition, you can also display the set of system statistics by using the DR Series system CLI **stats --system** command to show the following categories of system statistics:

- Capacity Used (system capacity used in Gibibytes or GiBs)
- Capacity Free (system capacity free in GiBs)
- Read Throughput (read throughput rate in Mebibytes or MiB/s)
- Write Throughput (write throughput rate in MiB/s)
- Current Files (current number of files in system)
- Current Bytes (current number of ingested bytes in system)
- Post Dedupe Bytes (number of bytes after deduplication)
- Post Compression Bytes (number of bytes after compression)
- Compression Status (current compression status)
- Cleaner Status (current space reclamation process status)
- Total Inodes (total number of data structures)
- Dedup Savings (deduplication storage savings by percentage)
- Compression Savings (compression storage savings by percentage)
- Total Savings (total storage savings by percentage)

Displaying DR Series System Statistics Using the CLI

An alternate method for checking the current DR Series system statistics is using the DR Series system CLI **stats --system** command to show the following categories of system statistics:

- Capacity Used (system capacity used in Gibibytes or GiBs)
- Capacity Free (system capacity free in GiBs)
- Read Throughput (read throughput rate in Mebibytes or MiB/s)
- Write Throughput (write throughput rate in MiB/s)
- Current Files (current number of files in system)
- Current Bytes (current number of ingested bytes in system)
- Post Dedupe Bytes (number of bytes after deduplication)
- Post Compression Bytes (number of bytes after compression)
- Compression Status (current compression status)
- Cleaner Status (current space reclamation process status)
- Total Inodes (total number of data structures)
- Dedupe Savings (deduplication storage savings by percentage)
- Compression Savings (compression storage savings by percentage)
- Total Savings (total storage savings by percentage)

For more information on DR Series system CLI commands, see the *Dell DR Series System Command Line Reference Guide*.

Displaying Container-Specific Statistics Using the CLI

You can display the set of container-specific statistics by using the DR Series system CLI **stats --container --name <container name>** command to show the following categories of statistics:

- Container Name (name of the container)
- Container ID (ID associated with container)
- Total Inodes (total number of data structures in container)
- Read Throughput (read throughput rate in Mebibytes or MiB/s for container)
- Write Throughput (write throughput rate in MiB/s for container)
- Current Files (current number of files in container)

- Current Bytes (current number of ingested bytes in container)
- Cleaner Status (current space reclamation process status for the selected container)

For more information on DR Series system CLI commands, see the *Dell DR Series System Command Line Reference Guide*.

Managing Replication Operations

If you plan on performing replication operations across a firewall, the DR Series system replication service requires that the following fixed TCP ports be configured to support replication operations:

NOTE: To allow replication storage information to be viewed by a corresponding data management agent (DMA), the target DR Series system needs to reside in the same domain as the source DR Series system in the replication relationship.

- port 9904
- port 9911
- port 9915
- port 9916

NOTE: If there are no existing containers, replication relationships, or any scheduled replication operations, the only Replication-related option that is enabled is **Create**. The **Edit**, **Delete**, **Stop**, **Start**, **Bandwidth**, and **Display Statistics** options are disabled (grayed out).

In the 2.0 release, DR Series systems support 32:1 replication of data. This means that multiple source DR Series systems (up to 32) can write data to different individual containers on a single, target DR Series system.

NOTE: Starting with Release 2.0, the DR Series system software includes version checking that limits replication only between other DR Series systems that run the same system software release version (DR Series systems running Release 2.0.x software can only replicate with other DR Series systems that run the same release system software). For example, Release 2.0.x systems will not be able to replicate with Release 2.1 or Release 3.0 systems, but can replicate with systems running Release 2.0.0.1 or 2.0.0.2.

NOTE: You need to be aware that the storage capacity of the target DR Series system is directly affected by the number of source systems writing to its containers, and also by the amount being written by each of these source systems.

Creating Replication Relationships

To create a new replication relationship, complete the following:

1. Select **Storage** → **Replication**.
   The **Replication** page is displayed, which lists all current replication entries by the following categories:
   - Local Container Name
   - Role (target or source)
   - Remote Container Name
   - Peer State (online or offline)
   - Bandwidth (replication bandwidth limit)

   NOTE: Bandwidth is the replication bandwidth limit that you can set as Kibibytes per second (KiBps), Mebibytes per second (MiBps), Gibibytes per second (GiBps), or as an unlimited bandwidth (default).
2. Click **Create** in the options bar.

The **Create Replication** page is displayed.

3. In **Step 1: Select a local container**, select a local container from the list of available containers.
4. In **Step 2: Select Encryption**, select one of the following encryption options: **None**, **128–bit**, or **256–bit**.
5. In **Step 3: Select a role**, select **Source** or **Target**.
6. In **Step 4: Remote container settings**, select one of these two options:
   - **Create container on remote system**. If you select this option, see Creating a Container on a Remote System (Replication), which describes the process of creating a container on a remote system.
   - **Map to container on remote system**. If you select this option, see Mapping to a Container on a Remote System (Replication), which describes the process of mapping to a container on a remote system.
7. Enter the required information in the Step 4: **Username**, **Password**, **Peer System**, and **Peer Container Name** fields.

   For more information, see Creating a Container on a Remote System (Replication) or Mapping to a Container on a Remote System (Replication), depending upon your selected option.
8. Click **Create Replication** (or click **Cancel** to display the **Replication** page).

   The **Successfully added replication** dialog is displayed when successful.

Creating a Container on a Remote System (Replication)

This topic describes the process for creating a replication relationship with a container on a remote system using the **Replication** page. For more information, see Creating Replication Relationships. The following procedure assumes you have completed the Step 1, Step 2, and Step 3 tasks for creating replication relationships, and you are selecting the **Create container on a remote system** option in **Step: 4 Remote container settings**.

To create a replication relationship with a container on a remote system, complete the following tasks:

NOTE: Exercise care when configuring the direction of replication for source and target containers. For example, target containers can have their contents deleted if they contain existing data.

1. In **Username**, type a valid user name for the peer system (for example, **administrator**).
2. In **Password**, type a valid password for the peer system (for example, **St0r@ge!**).
3. In **Peer System**, type the IP address that represents this peer system (for example, **10.10.10.10**).
4. In **Peer Container Name**, type a name for the new container (for example, **StorageReplica2**), or chose from an existing container on the peer system.
5. Click **Create Replication** (or click **Cancel** to display the **Replication** page).

   The **Successfully added replication** dialog is displayed when successful.

Mapping to a Container on a Remote System (Replication)

This topic describes the process for creating a new replication relationship by mapping to a container on a remote system using in the **Replication** page. For more information, see Creating Replication Relationships. The following procedure assumes you have completed the Step 1, Step 2, and Step 3 tasks in Creating Replication Relationships, and you are selecting the **Map to container on a remote system** option in **Step: 4 Remote container settings**.

To create a replication relationship by mapping to a container on a remote system, complete the following tasks:

NOTE: Exercise care when configuring the direction of replication for source and target containers. For example, target containers can have their contents deleted if they contain existing data.

1. Click **Map to container on remote system**.
2. In **Username**, type the valid user name for the peer system (for example, **administrator**).
3. In **Password**, type the valid password for the peer system (for example, **St0r@ge!**).
4. In **Peer System**, type the IP address that represents the peer system (for example, **10.10.10.10**).
5. In **Remote Container**, click **Retrieve Container(s)** to display the remote containers in the list box.

6. Select the desired remote container in the **Retrieve Container(s)** list box.
7. Click **Create Replication** (or click **Cancel** to display the **Replication** page).
   The **Successfully added replication** dialog is displayed when successful.

Editing Replication Relationships

To modify settings for an existing replication relationship, complete the following:

NOTE: Exercise care when configuring the direction of replication for source and target containers. For example, target containers can have their contents deleted if they contain existing data.

1. Select **Storage→ Replication**.
   The **Replication** page is displayed.
2. Click **Select** to identify the replication relationship that you want to modify, and click **Edit** in the options bar.
   The **Edit Replication** dialog is displayed.
3. Modify any of the following values as needed in **Step 2: Select Encryption**:
   - **None**
   - **128–bit**
   - **256–bit**
4. Modify any of the following values as needed in **Step 4: Remote container settings**:
   - **Username**
   - **Password**
   - **Peer System**

   NOTE: Because you cannot modify an existing defined role (source or target) for a replication relationship, if necessary you must delete the existing replication relationship, and recreate a new relationship with the specific source and target roles that you want.
5. Click **Save Replication** (or click **Cancel** to display the **Replication** page).
   The **Successfully updated replication** dialog is displayed when successful.

Deleting Replication Relationships

To delete an existing replication relationship, complete the following:

1. Select **Storage → Replication**.
   The **Replication** page is displayed.
2. Click **Select** to identify the relationship that you want to delete, and click **Delete** in the options bar.
   The **Delete Replication** dialog is displayed.
3. Click **OK** in the **Delete replication** dialog (or click **Cancel** to display the **Replication** page).
   The **Successfully deleted replication** dialog is displayed when successful.

Starting and Stopping Replication

To start or stop replication in an existing replication relationship, complete the following:

NOTE: For more information about setting up a Replication schedule, see Creating a Replication Schedule.

1. Select **Storage** → **Replication**.

   The **Replication** page is displayed.
2. Click **Select** to identify the replication relationship on which you want to stop (see step 3) or start (see step 4) the replication process.
3. To stop the scheduled replication process, click **Stop**, and click **OK** to stop replication (or click **Cancel** to display the **Replication** page).

   The **Successfully stopped replication** dialog is displayed.
4. To start the scheduled replication process, click **Start**, and click **OK** to start replication (or click **Cancel** to display the **Replication** page).

   The **Successfully started replication** dialog is displayed.

Setting the Replication Bandwidth

To set the replication bandwidth rate on a DR Series system, complete the following:

1. Select **Storage**→ **Replication**.

   The **Replication** page is displayed.
2. Click **Select** to identify the replication relationship on which you want to set the replication bandwidth speed rate, and click **Bandwidth**.

   The **Replication Bandwidth Throttling** dialog is displayed.
3. Select the IP address for the peer system from the **Peer System** drop-down list.
4. In **Set bandwidth throttling speed**, choose the replication bandwidth limit you want to set from the following choices:

   - Click **KBps** (Kilobytes per second), and type a value in the Rate box to set a rate in KBps.
   - Click **MBps** (Megabytes per second), and type a value in Rate box to set a rate in MBps.
   - Click **GBps** (Gigabytes per second), and type a value in Rate box to set a rate in GBps.
   - Click **Default (not limited)** to choose an unlimited replication bandwidth rate.

   NOTE: The minimum allowed replication bandwidth setting that you can configure is 192 KBps.
5. Click **Set Bandwidth** (or click **Cancel** to display the **Replication** page).

   The **Successfully set replication bandwidth** dialog is displayed when successful.

Displaying Replication Statistics

To display the statistics for an existing replication relationship, complete the following:

1. Select **Storage** → **Replication**.

   The **Replication** page is displayed.
2. Click **Select** to identify the replication relationship for which you want to display replication statistics, and click **Display Statistics** to display the **Statistics: Replication** page, which contains:

   - **Replication Filter**—the Container Filter section in this pane lets you select one or more replication containers, or all of the replication containers, one or more peer DR Series systems. The Headers section lets you select any of ten statistics type check boxes that you choose to display in the Replication Statistics summary table (by default, five check boxes are selected: **Peer Status**, **Replication Status**, **Network Throughput**, **Network Savings**, and **Progress %**).
   - **Replication Statistics Summary**—this pane displays the filtered statistics results based on the check box(es) you selected in the Replication Filter pane, and based on your container or peer system choices

listed under the corresponding table column. Depending upon the number of check boxes you select, you may need to use the horizontal scroll bar to display all of the statistics columns.

3. In the **Replication Filter** pane, select any of the following Container Filter choices for which you want to display your choice of replication statistics:
   - Click **All**—this displays replication statistics for all of the currently configured containers on the system.
   - Click **Name**, and select an individual container in the **Name** drop-down list—this displays replication statistics for a single container. To display more than one container, click **Ctrl** in the **Name** drop-down list, and select any additional containers you want to include.
   - Click **Peer System**, and select an individual peer DR Series system in the **Peer System** list box—this displays replication statistics for a single peer system. To display more than one peer system, click **Ctrl** in the **Peer System** list box, and select any additional peer systems you want to include.
4. In the **Replication Filter** pane, select from the following **Headers** check boxes that you want to filter and display in the Replication statistics summary table for the selected container(s):

   NOTE: Source systems running different DR Series system software versions (for example, one system with 1.0.1.2 software and another system with 1.1.1.0 software), will display some minor replication statistics differences in the **Containers: Statistics** and **Statistics: Replication** pages due to the difference of the system software version used on the source appliance.

   - **Peer Status**—indicates the current peer status (Insync, Paused, or Replicating).
   - **Replication Status**—indicates the current replication status (Offline, Online, Disconnected, Trying to Connect, or Stopped).
   - **Time to Sync**—indicates the time until system synchronization (in days/hours/minutes/seconds).
   - **Progress (%)**—indicates the current replication progress by percentage.
   - **Replication Throughput**—indicates the current replication throughput by percentage (%).
   - **Network Throughput**—indicates the current network throughput by percentage.
   - **Network Savings**—indicates the current network savings using replication by percentage.
   - **Last Time in Sync**—indicates the last time system synchronization occurred.
   - **Peer Container**—indicates the peer container in the replication relationship.
   - **Peer System**—indicates the IP address of the peer system in the replication relationship.

   For more information, see Displaying the Statistics: Replication Page.

Creating a Replication Schedule

Replication schedules can only be set on individual replication-enabled source containers. To create a Replication schedule on a replication-enabled source container, complete the following:

NOTE: If there is no Replication schedule set, but there is pending data that can be replicated, replication will run when it detects the following: 1) there are no active data ingests, and 2) five minutes of system idle time have elapsed since the last data file ingest completed.

NOTE: The **Replication Schedule** page displays the current DR Series system time zone and current timestamp (using this format: US/Pacific, Tue Oct 28 14:53:02 2012.

To schedule Replication operations on your system, complete the following:

1. Select **Schedules** → **Replication Schedule**.
   The **Replication Schedule** page is displayed.
2. Click to select the replication-enabled source container in the **Container** drop-down list.
   The Replication schedule table is displayed with columns that identify the week day, start time, and stop time.
3. Click **Schedule** to create a new schedule (or click **Edit Schedule** to modify an existing Replication schedule).

The **Set Replication Schedule** page is displayed.

4. Select (or modify) the **Start Time** and **Stop Time** setpoint values using the **Hour** and **Minutes** pull-down lists to create a Replication schedule. For an example, see Daily Replication Schedule Example and Weekly Replication Schedule Example.

   NOTE: You must set a corresponding **Stop Time** for every **Start Time** in each Replication schedule you set. The DR Series system will not support any Replication schedule that does not contain a **Start Time/Stop Time** pair of setpoints (daily or weekly).

5. Click **Set Schedule** for the system to accept your Replication schedule (or click **Cancel** to display the **Replication Schedule** page).

   NOTE: To reset all of the values in the current Replication schedule, click **Reset** in the **Set Replication Schedule** dialog. To selectively modify values in the current schedule, make your changes to the corresponding hours and minutes pull-down lists for the **Start Time** and **Stop Time** you wish to modify, and click **Set Schedule**.

   Dell recommends that you do not schedule the running of any Replication operations during the same time period when Cleaner or ingest operations will be running. Failure to follow this practice will affect the time required to complete the system operations and/or impact your DR Series system performance.

Daily Replication Schedule Example

The daily Replication schedule example in this topic illustrates the process for setting up a replication schedule that uses a 24-hour clock (the time keeping convention where time of day is defined on a 24–hour basis). You set or view a Replication schedule in the **Replication Schedule** page. For more information, see Creating a Replication Schedule.

NOTE: Replication schedules can only be set on individual replication-enabled source containers.

To set a daily replication schedule that starts at 16:00 hours (which is 4:00 PM in a 12–hour clock format) and stops at 23:00 hours (which is 11:00 PM in a 12–hour clock format) on Mondays, click **Edit Schedule** (if modifying an existing schedule) or **Schedule** (if creating a new schedule):

- Select 16 in the hours pull-down list and 00 in the minutes pull-down list to set a **Start Time** of 16:00 on Monday.
- Select 23 in the hours pull-down list and 00 in the minutes pull-down list to set a **Stop Time** of 23:00 for Monday.
- Set the **Start Time** and **Stop Time** setpoints for any remaining days of the week on which you want to schedule replication.

NOTE: You must set a corresponding **Stop Time** for every **Start Time** in each Replication schedule you set. The DR Series system will not support any Replication schedule that does not contain a **Start Time/Stop Time** pair of setpoints (daily or weekly).

Weekly Replication Schedule Example

The following example shows how to set up a weekly Replication schedule with a start time at 01:00 am on Saturday and a stop time at 01:00 am on Sunday. The DR Series system uses the 24-hour clock convention for its time keeping in which each day is divided into twenty-four 1-hour segments.

NOTE: Replication schedules can only be set on individual replication-enabled source containers that you select from the **Container** drop-down list.

-
- Select 01 in the hours pull-down list and 00 in the minutes pull-down list to set a Start Time of 01:00 for Saturday.
- Select 01 in the hours pull-down list and 00 in the minutes pull-down list to set a Stop Time of 01:00 for Sunday

NOTE: You need to click **Set Schedule** for the DR Series system to accept your Replication schedule.

For more information on Replication schedules, see Creating a Replication Schedule.

6

Monitoring the DR Series System

This topic introduces the ways in which you monitor the current state of DR Series system operations using the **Dashboard** page options in the navigation panel. The **Dashboard** page displays a summary of current system status categories (**System State**, **HW State**, **Number of Alerts**, and **Number of Events**. In addition, this page displays **Capacity**, **Storage Savings**, and **Throughput**), and includes the **System Information** pane. There are links to other system pages (the **Health**, **Alerts**, and **Events** pages) that you can use to display the current state of the system health (by the status of its components), display the current system alerts, and current system events for your DR Series system.

Monitoring Operations Using the Dashboard Page

The **Dashboard** page contains system status indicators for the current state of the DR Series system (**System State**), current hardware state (**HW State**), current number of system alerts (**Number of Alerts**), and current number of system events (**Number of Events**). The **Dashboard** page also contains data graphs that display:

- **Capacity**—used space and free space available in percentage and total (in Gibibytes or Tebibytes)
- **Storage Savings**—total savings in percentage based on time (in minutes), which can be displayed in 1h (1–hour, which is the default), 1d (1–day, 5d (5–day), 1m (1–month, or 1y (1–year) durations.
- **Throughput**—for reads and writes in volume based on time (in minutes), which can be displayed in 1h (1–hour, which is the default), 1d (1–day, 5d (5–day), 1m (1–month, or 1y (1–year) durations.

The **Dashboard** page also displays a System Information pane that lists key information about this DR Series system (such as product name, system name, software version, and a number of other key categories). For details about the System Information pane, see System Information Pane.

System Status Bar

The **Dashboard** page contains a System Status pane with icons that indicate the current system status and provide links for more DR Series system status information:

- **System State**
- **HW State** (with a link to the **Health** page)
- **Number of Alerts** (with a link to the **Alerts** page)
- **Number of Events** (with a link to the **Events** page)

For more detailed information about the System Status pane icons:

- **System State**, see Monitoring System Usage.
- **HW State**, see Monitoring System Health.
- **Number of Alerts**, see Monitoring System Alerts.
- **Number of Events**, see Monitoring System Events.

Location	Status Icon	Description
System Status bar		Represents an optimal state.
System Status bar		Represents a warning state (a non-critical error was detected).
System Status bar		Represents an actionable state (a critical error was detected).

NOTE: To display specific information about the current **HW State**, click the link to display the **Health** page. The **Health** page displays the current status of the DR Series system hardware and expansion shelf enclosures (if installed): front and rear chassis views, showing hard drive, power supply, cooling fan, and connection locations. The System Hardware Health pane for the DR Series system provides status for the power supplies, cooling fans, temperature, storage, voltage, network interface cards (NIC), CPU, DIMM, and NVRAM. The System Hardware Health pane for the external expansion shelf enclosures provides status for the power supplies, cooling fans, temperature, storage, and the Enclosure Management Module (EMM).

NOTE: To display more information about the current **Number of Alerts**, click the link to display the **Alerts** page. The **Alerts** page displays the total number of alerts, and lists each system alert by index number, timestamp, and message that briefly describes alert status.

NOTE: To display more information about the current **Number of Events**, click the link to display the **Events** page. The **Events** page displays the total number of events, and lists each system event by index number, severity (critical, warning, and informational), timestamp, and a message that briefly describes event status.

DR Series System and the Capacity-Storage Savings-Throughput Panes

There are three central panes in the **Dashboard** page that display data graphs which illustrate the current DR Series system status for **Capacity**, **Storage Savings**, and **Throughput**:

- **Capacity**—displays the used and free physical storage capacity in percentages and volume in Gibibytes and Tebibytes (GiBs and TiBs).
- **Storage Savings**—displays a total savings in percentages (combining both deduplication and compression) over a time period (in minutes).
- **Throughput**—displays the throughput volume in Mebibytes/second (MiB/s) for read and write operations over a time period (in minutes).

NOTE: For both the **Storage Savings** and **Throughput** data graphs, you can choose to display the current values in 1h (1-hour, the default), 1d (1-day), 5d (5-days), 1m (1-month), and 1y (1-year) durations.

System Information Pane

Located in the lower part of the **Dashboard** page, the System Information pane displays the following categories of current system information:

- **Product Name**
- **System Name**
- **Software Version**
- **Current Date/Time**
- **Current Time Zone**

- **Cleaner Status**
- **Total Savings** (in percentage)
- **Total Number of Files in All Containers**
- **Number of Containers**
- **Number of Containers Replicated**
- **Active Bytes** (total bytes before optimization)

NOTE: To display additional information about certain elements in the DR Series system GUI, click the corresponding Question Mark (?) icon.

Monitoring System Alerts

You can monitor the DR Series system alerts and display the current state of the system using the navigation panel, the **Dashboard** page, and its options:

- Using the **Dashboard** page, you can access the **Alerts** page via the **Number of Alerts** link.
- Using **Dashboard**→ **Alerts**, you can access the **Alerts** page from the navigation panel.
- The Alerts page lists the number of system alerts, the current time zone, and provides a summary table of alerts defined by index number, timestamp of the system alert, and a brief message describing the alert. For more information, see Displaying System Alerts.

Using the Dashboard Alerts Page

To use the **Dashboard** page to display the current number of system alerts, complete the following:

NOTE: This method in convenient when you are already at the **Dashboard** page and want to quickly display more information about system alerts.

1. Click **Number of Alerts** on the **Dashboard** page.
   The **Number of Alerts** in the System Status bar provides a link (which indicates the number of alerts, in this case 2 alerts, which are listed in the **Number of Alerts: 2** link).
2. Click the **Number of Alerts** link (in this example, **2**).
   The **Alerts** page is displayed.
3. View the list of system alerts in the System Alerts summary table, identified by index number, timestamp, and a brief message that describes the alert.
   For more information, see Dashboard Page and Options and Displaying System Alerts.

Viewing the System Alerts

To use the DR Series navigation panel to display the current number of system alerts, complete the following:

1. Click **Dashboard** → **Alerts** in the navigation panel.
   The **Alerts** page is displayed, which lists the number of system alerts in the System Alerts summary table, and provides the current timezone (for example, US/Pacific).
2. Review the system alerts listed in the System Alerts summary table, which identifies each alert by:
   - Index number (for example: 1, 2, ...).
   - Timestamp (in yyyy-mm-dd hh:mm:ss format; for example, 2012–10–30 10:24:53).

– Message (a brief description of the alert; for example, *Network Interface Controller Embedded (LOM) Port 2 disconnected. Connect it to a network and/or check your network switches or routers for network connectivity issues*).

Monitoring System Events

You can monitor the DR Series system events, and filter events you want to display using the Event Filter pane in the **Events** page. This page can display **All** system events, or you can restrict the events to only one of the following types: **Info** (Informational), **Warning**, or **Critical** events.

The **Events** page lets you search for system events and monitor the current state of the DR Series system based on the system events that match your search criteria. For more information about using the Event Filter pane, see Using the Event Filter.

To monitor the system, using either of the following methods to display the **Events** page:

- In **Dashboard** page, click the **Number of Events** link in the **Events** page.
- In the navigation panel, click **Dashboard** → **Events** to display the **Events** page.

Using the Dashboard to Display System Events

To use the **Dashboard** page to display the current number of system events (**Number of Events**), complete the following:

NOTE: This method in convenient when you are already at the **Dashboard** page and want to display the current system events.

1. In the **Dashboard** page, click the **Number of Events** link in the System Status bar (for example, **Number of Events: 2**).
   The **Events** page is displayed and lists the total number of current events, the Event Filter, the Events summary table, and the current time zone.
2. In the Event Filter pane, you can select to filter events by using the **Event Severity** pull-down list, and setting the **Timestamp From** and **Timestamp To** starting and ending setpoints.
3. In the **Event Severity** pull-down list, select the severity level of events that you want to filter and display (**All**, **Critical**, **Warning**, or **Info**).
4. In **Message Contains**, enter a word or string of words you want to search for in the **Message** text field, and the DR Series system will perform a case-insensitive match for your entry (no other search options are supported). Matches are displayed in the Events summary table.
5. In **Timestamp From**, click in the field or click the calendar icon to display the current month and day.
   – Click and select a day in the current month schedule (or use the left and right arrows in the month title to select a previous or later month, respectively).
   – Use the **Hour** and **Minute** sliders to set the desired time in hours and minutes, or click **Now** to use the current time.
   – When configured, click **Done**.
6. In **Timestamp To**, click in the field or click the calendar icon to display the current month and day.
   – Click and select a day in the current month schedule (or use the left and right arrows in the month title to select a previous or later month, respectively).
   – Use the **Hour** and **Minute** sliders to set the desired time in hours and minutes, or click **Now** to use the current time.
   – When configured, click **Done**.
7. Click **Start Filter** to display system events in the Events summary table based on the settings you selected.
   The Events summary table displays system events based on **Index**, **Severity**, **Timestamp**, and **Message** (a brief description of event). To navigate and display results in the Events summary table, complete the following:

- Set the number of events to display per page: click **Events per page** at the lower-right corner of the table and select either **25** or **50** events to display per page.
- Use the scroll bar to display each full page of system events.
- To display other pages of system events, click **prev** or **next**, click on a specific page number, or enter a page number in the **Goto page** and click **Go** to display that page of system events.

8. To clear the current filter settings, click **Reset** and set new filter values using the process described in steps 3 through 6.

   For more information about using the Event Filter on the **Events** page, see Using the Event Filter.

Using the Dashboard Events Option

To use the DR Series navigation panel to display the current number of system events, complete the following:

1. Click **Dashboard**→ **Events** in the navigation panel.

   The **Events** page is displayed, which lists the total number of system events in the System Events summary table, and provides the current timezone (for example, US/Pacific).
2. View the list of current system events in the System Events summary table, which are grouped by index number, severity, timestamp, and a brief description of the event message.
3. Use the **Event Filter** to search for events that match the criteria you select (event severity, message content, timestamp from, and timestamp to ranges).

   For more information on using the **Event Filter**, see Using the Event Filter and Using the Dashboard to Display System Events.

Using the Event Filter

The **Events** page contains an Event Filter pane that lets you filter the type of system events you want to display in the Events summary table. Event filtering is done by selecting the severity level and using a timestamp. Choose the severity level by selecting it in the **Event Severity** drop-down list, and refine your search by selecting specific start and end setpoints in **Timestamp from** and **Timestamp to**.

To filter the system events you want to display in the Events summary table, complete the following:

1. Click **Dashboard** → **Events** (or access the **Events** page via the **Number of Events** link).

   The **Events** page is displayed, which lists the number of current events and the current time zone set for the system.
2. In the Event Filter pane, select the desired severity to display from the **Event Severity** drop-down list.

   System event severity levels include:

   - **All**—displays all four types of system events (All, Critical, Warning, and Info)
   - **Critical**—displays only critical events (in red)
   - **Warning**—displays only warning events (in yellow)
   - **Info**—displays only informational events
3. In **Message Contains**, enter a word or string of words that you want to search for in the **Message** text field, and the DR Series system will perform a case-insensitive match for your entry (no other search options are supported). Matches are displayed in the Events summary table.
4. Click the **Calendar** icon (adjacent to **Timestamp From**) to configure a start setpoint.

   To configure a start setpoint, complete the following:

   - Select the desired day in the current month, or click the left or right arrow in the month title bar to select a previous or later month.
   - Adjust the **Hour** and **Minute** sliders to the desired time (or click **Now** to set the date and time as the current date and time in hours and minutes).

– Click **Done**.

5. Click the **Calendar** icon (adjacent to **Timestamp To**) to configure an end setpoint.

   To configure an end setpoint, complete the following:

   – Select the desired day in the current month, or click the left or right arrow in the month title bar to select a previous or later month.
   – Adjust the **Hour** and **Minute** sliders to the desired time (or click **Now** to set the date and time to be the current date and time in hours and minutes).
   – Click **Done**.

6. Click **Start Filter** (or click **Reset** to return all values to default values).

   The search results based on your filter choices are displayed in the Events summary table.

For more information about using the Events summary table, see Using the Dashboard to Display System Events.

Monitoring System Health

Monitor and display the current state of your system hardware status using one of two methods in the DR Series system:

- Using **Dashboard**→ **Health** , you can access the **Health** page from the navigation panel.
- In the **Dashboard** page, you can access the **Health** page via the **HW State** link.

For more information about the **Health** page, see Health.

Using the Dashboard Page to Monitor System Health

To use the **Dashboard** page to display and monitor the current DR Series system hardware status, complete the following:

1. Click **Dashboard** in the navigation panel.

   The **Dashboard** page is displayed and provides a **HW State** link in the System Status bar (for example, **HW State: optimal**). (You can also access the **Health** page when you click **Dashboard**→ **Health**.)

2. Click the **HW State** link (in this example, **optimal**) to display the **Health** page.

   The **Health** page provides a **System** tab, which is the default displayed on this page. If you have installed one, your system will also include an **Enclosure** tab (this release supports up to two expansion shelves being installed). The **System** tab displays front and rear views of the chassis showing the disk drive locations in the front view (0–11), the OS internal drives (12–13), and the fans, system connectors, and power supplies in the rear view. If installed and clicked, the **Enclosure** tab displays front and rear views of the enclosure chassis showing the physical disk locations (0–11) in the front view, and the enclosure connectors, fans, and pluggable drive locations in the rear view. In addition, the service tag of the expansion shelf is displayed. Both the **System** and **Enclosure** tabs display the System Hardware Health summary table that lists the current status of all major components in the DR Series system or its expansion shelf, respectively.

   NOTE: This method is convenient when you are already at the **Dashboard** page and want to display more information about current System Status.

   DR Series system — System Hardware Health components

   – Power Supplies
   – Fans
   – Temperature
   – Storage
   – Voltage

- NIC
- CPU
- DIMM
- NVRAM

Enclosure — System Hardware Health components

- Power Supplies
- Fans
- Temperature
- Storage
- Enclosure Management Module (EMM)

Using the Dashboard Health Options

To use the navigation panel to display the current system status of the DR Series system components (or any expansion shelf enclosure) that are installed, complete the following:

1. Click **Dashboard** → **Health**.
   The **Health** page is displayed.
2. Mouse over the chassis front and rear panel views on the **Health** page to display a dialog with the status, name, and state for the DR Series system disk drives and OS drives (DR4000 and DR4100 system).
   Use the same process to display a similar dialog with the status and name for the power supplies and rear panel connectors for an expansion shelf enclosure.
3. View the status in the System Hardware Health summary table for all of the DR Series system or expansion shelf components (depending upon the tab selected, **System** or **Enclosure**).
   To display additional information, click to expand each component in the corresponding summary table.

   NOTE: The **Health** page provides status of the DR Series chassis front and rear views showing the chassis drives (0-11), the power supplies (PS1 and PS2), and the OS internal drives (12 and 13) for the DR4000 system (in the DR4100 system, the OS drives reside in the rear chassis). In addition, all other major DR Series system components are listed in the System Hardware Health table (Power Supplies, Fans, Temperature, Storage, Voltage, NIC (network interface card), CPU, DIMM (dual in-line memory module), and NVRAM. For each installed expansion shelf (**Enclosure 1** or **Enclosure 2**), the **Health** page provides status of the expansion shelf chassis front and rear views showing the chassis drives (0–11) and lists the service tag. The System Hardware Health table for the enclosure lists the Power Supplies, Fans, Temperature, Storage, and Enclosure Management Module (EMM).

For more information about the system components and the **Health** page, see Health, Monitoring System Health, and Using the Dashboard Page to Monitor System Health.

Understanding DR Series System NICs And Ports

Two key components of the DR Series system interaction between its containers and the network involves the network interface cards (NICs) and system ports. The DR Series system supports the use of the following types of NICs:

- 1-Gigabit Ethernet (GbE) two-port (10-Base T); Dell recommends using CAT6a copper cabling
- 10-GbE two-port (100-Base T); Dell recommends using CAT6a copper cabling
- 10-GbE SFP+ two-port using LC fiber-optic transceivers or twin-axial cabling

The 1-GbE, 10-GbE, and 10-GbE SFP+ NICs configurations bond multiple Ethernet ports into a single interface by default:

- For the 1-GbE ports, this means that the four ports in the DR4000 system (or the six ports in the DR4100 system) are bonded together to form one interface connection.
- For the 10-GbE and 10-GbE SFP+ ports, this means that to operate at maximum speed, only the two high-speed Ethernet ports are bonded together to form one interface connection.

The DR Series system supports configuring the NICs to use either of the two following supported bonding configurations:

- **ALB**—adaptive load balancing (ALB) is the default; this configuration does not require special switch support, but it does require the data source machine to be on the same subnet as the DR Series system. The ALB is mediated by the Address Resolution Protocol (ARP).
- **802.3ad**—also known as Link Aggregation Control Protocol (LACP) is used for copper-wired Ethernet applications; this configuration does require special switch management (the requirement being that it be managed from the switch).

For more information, see Configuring Networking Settings.

ALB and the 802.3ad are link aggregation methods that aggregate or combine multiple network connections in parallel to increase throughput beyond what a single connection could support.

Link aggregation for Ethernet connections also provides redundancy, in case one of the links fails. The DR Series system also comes with a Serial-Attached SCSI (SAS) card for future enhancements.

The DR Series system ships equipped with the 1-GbE, I-GbE, or 10-GbE SFP+ NIC. To visually differentiate between the NIC types, observe the markings on the NICs installed in the rear chassis of the DR Series system:

- 1-GbE NIC is labeled as GRN=10 ORN=100 YEL=1000
- 10-GbE NIC is labeled as 10G=GRN 1G=YLW

NOTE: There are three key requirements to meet if you choose to use the 10-GbE NIC configuration: 1) use only CAT6a copper cabling, 2) you must have two switch ports capable of supporting 10-GbE NICs, and 3) you do not connect the 1-GbE ports.

NOTE: There are three key requirements to meet if you choose to use the 10-GbE SFP+ NIC configuration: 1) use only Dell-supported SFP+ transceivers, 2) you must have two switch ports capable of supporting 10-GbE SFP+ NICs (and LC fiber-optic or twin-axial cabling), and 3) you do not connect the 1-GbE ports.

To verify the types of NICs that are installed in your system, click **System Configuration** → **Networking** to display the NIC information. For more information, see Configuring Networking Settings. In addition, you can also use the DR Series system CLI **network --show** command to display other NIC-related information.

Monitoring System Usage

To display the current DR Series system usage, click **Dashboard** → **Usage** to display the **Usage** page. This page allows you to monitor system status and the currently displayed system usage status is based on the **Latest Range** or **Time Range** settings that are in effect. These settings define the output for the following tab categories on the **Usage** page:

- **CPU Load**
- **System**
- **Memory**
- **Active Processes**
- **Protocols**
- **Network**
- **Disk**

- **All**

NOTE: When you click **All**, this tab displays the following DR Series system status categories: **CPU Load**, **System Usage**, **Memory Usage - Total**, **Memory Usage - Real**, **Active Processes - Total**, **NFS Usage - Total**, **CIFS Usage - Total**, **Network Usage**, **Socket Usage - Total**, **Active Connections**, **Disk Usage - Meta Data**, and **Disk Usage - Data Storage**.

Displaying Current System Usage

To display the current usage for a DR Series system, complete the following:

1. Click **Dashboard** → **Usage**.
   The **Usage** page is displayed.
2. View the current system usage based on the current **Latest Range** or **Time Range** values in effect (the default is the last 1-hour period). By default, the **CPU Load** is always the first tab that displays when the **Usage** page is selected.
   The tabs you can display in the **Usage** page include: **CPU Load**, **System**, **Memory**, **Active Processes**, **Protocols**, **Network**, **Disk**, and **All**. For more information, see System Usage.
3. Click any of the system usage tabs to display the current status for that tab category (or click **All** to display all of the system usage tab results).
   For example, click **Protocols** to display the current results for the **NFS Usage - Total**, **CIFS Usage - Total**, and **OST Usage - Total** for the system.

Setting a Latest Range Value

To set a **Latest Range** value and display system status results based on this setting, complete the following:

1. Click **Dashboard** → **Usage**.
   The **Usage** page is displayed.
2. Click **Latest Range**.
3. Select the desired duration period (**Hours**, **Days**, or **Months**) in the **Range** drop-down list.
   By default, **Hours** is the first displayed duration option in the drop-down list.
4. Select a value in the **Display last...** drop-down list that matches the **Range** duration time period you selected.
   For example, **Hours** (the default display period shown) lists choices between 1-24. If **Days** is selected, the choices listed are between 1-31, and if **Months** is selected, the listed choices are between 1-12.
5. Click **Apply**.
6. Click the tab that corresponds to the usage type you want to view based on the selected settings (or click **All** to display all of the system results based on the selected settings).
   For more information, see Usage and Displaying Current System Usage.

Setting a Time Range Value

To set a **Time Range** value and display system status results based on these settings, complete the following:

1. Click **Dashboard** → **Usage**.
   The **Usage** page is displayed.
2. Click **Time Range**.
3. In **Start Date**, click the **Start Date** field (or **Calendar** icon) to display the current month.

To select a previous month, click the left arrow in the month title bar to select the desired month in the current year (or previous year).

4. To choose the **Start Date** day in the selected month, you have two options:
   - Choose a specific day in the selected month (only the available days are displayed). Future days are considered unavailable (and appear dimmed out).
   - Click **Now** to select the current date and time in **Hours** and **Minutes** (or use the **Hour** and **Minute** sliders to select a desired time value).
5. Click **Done** to display your date and time settings in **Start Date**.

   The date and time settings you set appear in an mm/dd/yyyy hh:mm AM/PM format.
6. In **End Date**, perform the same process that you did for setting the **Start Date** to specify an end date (or select **Set "End Date" to current time**).
7. Click **Apply**.
8. Click the tab that corresponds to the usage type you want to monitor using your choice of settings (or click **All** to display all of the system usage tab results based on your choice of settings).
9. Observe the DR Series system usage results based on the criteria selected.

   For more information about the **Usage** page, see Usage and Displaying Current System Usage.

Monitoring Container Statistics

Click **Dashboard** → **Statistics: Container** to monitor statistics for the container that you selected in the **Container Name:** drop-down list, which displays current statistics in the following panes:

- **Backup Data**
- **Throughput**
- **Marker Type**
- **Connection Type**
- **Replication**

For more information, see Backup Data Pane, Throughput Pane, Connection Type Pane, Replication Pane, Statistics: Container Page, and Editing Container Settings.

Displaying the Statistics: Container Page

To display container statistics for a selected container, complete the following:

1. Click **Dashboard**→ **Statistics: Container**.

   The **Statistics: Container** page is displayed.
2. In the **Container Name:** drop-down list, select the container you want to monitor.

   NOTE: When you select a container, all statistics displayed on the **Statistics: Container** page represent specific information about the backup data, throughput, replication, marker type, and connection type for the selected container. The displayed statistics will vary depending upon the connection type used by the specified container.
3. View the current statistics in the Backup Data and Throughput panes.

   The Backup Data pane displays the number of active files ingested based on time (in minutes), and the number of active bytes ingested based on time (in minutes). The Throughput pane displays the number of read data in Mebibytes/per second (MiB/s) based on time (in minutes), and the number of write data in MiB/s based on time (in minutes).

NOTE: The Current Time Zone for the DR Series system is displayed below the Backup Data pane (for example, System Time Zone: US/Pacific).

4. In the Backup Data and Throughput panes, click **Zoom** to select which duration period you want to display:
   - 1h (1-hour is the default duration displayed)
   - 1d (1-day)
   - 5-d (five-day)
   - 1m (1-month)
   - 1y (1-year)

   NOTE: To refresh the values listed in the Backup Data and Throughput panes, click .
5. The Marker Type pane displays the marker type associated with the container (supported marker types include **None**, **Auto**, **CommVault**, **Networker**, **TSM** (Tivoli Storage Manager), or **ARCserve**.

   If the **Auto** marker type is selected, this means all marker types will be detected. If you have a specific marker type selected (for example, **CommVault**), this means you have specified traffic to the container from that DMA type. If marker detection for the container is disabled, this means the **None** marker type is selected.
6. In the Connection Type pane, view information about the configured connection type for the selected container which can be NFS, CIFS, NFS/CIFS, or OST (the following example shows an NFS/CIFS container):
   - NFS Connection Configuration pane—NFS access path, Client Access, NFS Options, and Map root to.
   - CIFS Connection Configuration pane—CIFS share path and Client Access.
   - If the container is an OST connection type container, the Connection Type OST pane—displays three tabs: **Capacity**, **Duplication**, and **Client Statistics**. The **Capacity** tab displays a Capacity pane with Status, Capacity, Capacity Used, and Total Images. The **Duplication** tab displays a Duplication Statistics pane with Inbound and Outbound statistics in the following categories: Bytes Copied (logical), Bytes Transferred (actual), Network Bandwidth Settings, Current Count of Active Files, and Replication Errors. The **Client Statistics** tab displays a Client Statistics pane with Images Ingested, Images Complete, Images Incomplete, Images Restored, Bytes Restored, Image Restore Errors, Image Ingest Errors, Bytes Ingested, Bytes Transferred, and Network Savings.
7. In the Replication pane (for NFS/CIFS connection types), view the replication information for the selected container in the following two panels:
   - Replication Configuration—Enable, Role, Remote Container Name, Bandwidth, and encryption.
   - Replication Status—Peer State, Replication State, Replication Average Transfer Rate, Replication Peak Transfer Rate, Network Average Transfer Rate, Network Peak Transfer Rate, Estimated Time to Sync (in days, hours, minutes, and seconds), Savings (in percentage), Last INSYNC Time (yyyy-mm-dd hh:mm:ss), and Schedule Status (next starting time in days, hours, minutes, and seconds).

Monitoring Replication Statistics

Click **Dashboard** → **Statistics: Replication** to display and monitor replication statistics for one (or more) containers, and one (or more) peer DR Series systems selected in the Replication Filter pane. Depending upon the configured settings, you can monitor and display replication statistics for:

- All containers
- One or more specific containers
- One or more peer DR Series systems

The Replication Filter pane contains 10 Headers check boxes that when selected display replication statistics for the container(s) or other peer DR Series system(s) you select in **Container Filter**.

After selecting the container(s), peer system(s), and the replication statistic categories, click **Apply Filter** to display the replication statistics results based on the search criteria you selected.

Using the **Statistics: Replication** page, you can selectively filter and display specific types of related replication statistics for all, one or more than one container, or one or more other peer DR Series systems.

For more information about Replication statistics, see Displaying Replication Statistics, Container Filter, and Displaying the Statistics: Replication Page.

Displaying the Statistics: Replication Page

To display system replication container statistics for a selected container or another DR Series system, complete the following:

1. Click **Dashboard→ Statistics: Replication**.

   The **Statistics: Replication** page is displayed.
2. To select a container or another peer DR Series system, choose the appropriate **Container Filter** option.
   - Click **All** to choose all of the replication containers.
   - Click **Name**, press **Ctrl**, and select the containers in the list box to select one or more containers in the list that you want to display.
   - Click **Peer System**, press **Ctrl**, and select the peer systems in the list box to select one or more peer DR Series systems in the list that you want to display.

   NOTE: Only one of the **Container Filter** options can be active at any one time (they are mutually exclusive).
3. Select the **Header** check box(es) for the replication statistics categories for which you want to filter and display in the Replication Statistics summary table:
   - **Peer Status**
   - **Replication Status**
   - **Time to Sync**
   - **Progress %** (percentage)
   - **Replication Throughput**
   - **Network Throughput**
   - **Network Savings**
   - **Last Sync in Time**
   - **Peer Container**
   - **Peer Status**

   NOTE: The following five types of replication statistics are enabled by default: **Peer Status**, **Replication Status**, **Network Throughput**, **Network Savings**, and **Progress %**. If you choose more than five types of statistics (when you select additional check boxes), a horizontal scroll bar appears at the bottom of the Replication Statistics table. Use this scroll bar to display the columns of additional statistics that may not display within the main window.
4. Click **Apply Filter** to display the replication statistics types you selected to filter for your container or other peer DR Series system choices.

   The Replication Statistics summary table displays the replication statistics types you selected in the Replication Filter pane.

   To reset the default settings in the Replication Filter pane, click **Reset**.

   To update the Replication Filter table after making a change, click **Apply Filter** to display an updated set of replication statistics.

   NOTE: Use the horizontal and vertical scroll bars to navigate through the columns of replication statistics displayed in the Replication Statistics summary table.

Displaying Replication Statistics Using the CLI

In addition to using the DR Series system GUI to display replication statistics, you can also display statistics for a specific replication container by using the DR Series system CLI **stats --replication --name <container name>** command to view the following replication container statistics categories:

- Container Name (name of the replication container)
- Replication Source Container (name that identifies the data source)
- Replication Source System (IP address or host name of the data source)
- Peer Status (current status of replication peer; for example, paused)
- Replication State (current state of replication relationship; for example, insync)
- Schedule Status (current status in days, hours, minutes, seconds)
- Replication Average Throughput (in Kebibytes per second, KiB/s)
- Replication Maximum Throughput (in KiB/s)
- Network Average Throughput (average throughput rate in KiB/s)
- Network Maximum Throughput (maximum throughput rate in KiB/s)
- Network Bytes Sent (total network bytes sent in Mebibytes/MiB)
- Dedupe Network Savings (total deduplication network savings in percentage)
- Compression Network Savings (total compression network savings in percentage)
- Last INSYNC Time (date of last sync operation in yyyy-mm-dd hh:mm:ss format)
- Estimated time to sync (time until next sync operation in days, hours, minutes, and seconds)

Data replication history is also displayed on a file-by-file basis, with a replication timestamp, and other file related information.

For more information about DR Series system CLI commands, see the *Dell DR Series System Command Line Reference Guide*.

7

Using the DR Series System Support Options

You can use the **Support** page and its **Diagnostics**, **Software Upgrade**, and **License** options to maintain the state of your DR Series system. To access these options, use the DR Series system navigation panel (for example, click **Support**→ **Diagnostics** to display the **Diagnostics** page) or use the **Diagnostics**, **Software Upgrade**, or **License** links on the **Support** page.

Support Information Pane

The **Support** page displays the Support Information pane, which provides the following information about the DR Series system:

- **Product Name**—DR Series system product name
- **Software Version**—DR Series system software version installed
- **Service Tag**—DR Series system appliance bar code label
- **Last Diagnostic Run**—timestamp of latest diagnostics log file (for example, Tue Nov 6 12:39:44 2012)
- **BIOS Version**—current version of installed BIOS
- **MAC Address**—current address in standard two-digit hexadecimal grouping format
- **iDRAC IP Address**—current IP address of iDRAC (if applicable)
- **Ethernet Ports**—displays information about bonded ports only (if the 10-GbE NICs are installed, it only displays information about the two supported 10–GbE ports):
  - Eth0 MAC address and port speed
  - Eth1 MAC address and port speed
  - Eth2 MAC address and port speed in
  - Eth3 MAC address and port speed in

  NOTE: This example shows four Ethernet ports bonded (such as if a DR4000 system with 1–GbE ports as a single interface). For more information on possible port configurations, see the system chassis descriptions in Local Console Connection.
- The **support.dell.com** Dell Support link

NOTE: The Support Information pane contains important information that may be needed if you contact Dell Support for any technical assistance.

NOTE: For additional system information, click **Dashboard** in the navigation panel to display its System Information pane, which lists **Product Name**, **System Name**, **Software Version**, **Current Date/Time**, **Current Time Zone**, **Cleaner Status**, **Total Savings** (in percentage), **Total Number of Files in All Containers**, **Number of Containers**, **Number of Containers Replicated**, and **Active Bytes**.

Diagnostics Page and Options

The options on the **Diagnostics** page allow you to generate new diagnostics log files that capture the current state of your system (**Generate**), download diagnostics log files to the local system (**Download**), or delete existing diagnostics log files (**Delete**).

NOTE: For more information about diagnostics log files, log file directories, and the Diagnostics service, see About The Diagnostics Service.

A DR Series diagnostics log file is a bundle that contains a variety of file types that record the latest system settings, and saves them in a compressed .lzip file format. The **Diagnostics** page identifies each diagnostics log file by the following attributes:

- File name—in this format, <*hostname*>_<*date*>_<*time*>.lzip, as in this example: **acme-sys-19_2012-10-12_13-51-40.lzip**

  NOTE: Diagnostic log file names are limited to 128 characters.
- Size—in Megabytes (for example, 58.6 MB).
- Time—timestamp when log file was created (for example, Fri Oct 12 13:51:40 2012).
- Reason for generation—describes reason log file was generated (for example, [admin-generated]: generated by Administrator).

  NOTE: Diagnostic reason descriptions are limited to 512 characters, and the descriptions can only be added using the DR Series system CLI.
- Status—indicates status of log file (for example, Completed).

There are two methods to display the **Diagnostics** page:

- Using the **Support** page (to access the **Diagnostics** page via the **Diagnostics** link).
- Using **Support** → **Diagnostics** (to access the **Diagnostics** page from the navigation panel).

If you have multiple pages of diagnostics log files, you can navigate to another page by using the controls are the foot of the Diagnostics summary table:

- Click **prev** or **next** to move back or forward one page.
- Double-click the listed page number (adjacent to **Goto** page).
- Enter a page number in **Goto** page, and click **Go**.
- Use the scroll bar at the right side of Diagnostics summary table to view all of the diagnostics log files available to display.

NOTE: You can also set how many entries you want to display per page in the Diagnostics summary table. In the **View per page** drop-down list, click **25** or **50** to select the desired number of entries to display.

Generating a Diagnostics Log File

A DR Series diagnostics log file is a bundle that contains a variety of file types that record the latest system settings, and saves them in a compressed .lzip file format. The **Diagnostics** page identifies each diagnostics log file by the following attribute types:

- File name
- Size
- Time
- Reason for generation
- Status

NOTE: When you generate a diagnostics log file bundle, it contains all of the DR Series system information that may be needed when contacting Dell Support for technical assistance.

The diagnostics log file bundle collects the same type of hardware, storage, and operating system information collected by the Dell System E-Support Tool (DSET) from the Dell DR Series system hardware.

The diagnostics log file bundle is identical to one created using the DR Series system CLI **diagnostics --collect --dset** command. System diagnostics information can assist Dell Support when troubleshooting or evaluating your DR Series system.

To generate a diagnostics log file bundle for your system, complete the following:

1. Select **Support** → **Diagnostics** in the navigation panel.
   The **Diagnostics** page is displayed, and this page lists all current diagnostics log files.
2. Click **Generate**.
   A **New log file is scheduled** dialog is displayed.
3. To verify that a new diagnostics log file is being generated, check the status of the diagnostics log file by selecting **Support** → **Diagnostics**.
   The **Diagnostics** page is displayed, and a status showing **In-progress** indicates that a new diagnostics log file is being generated.

Once completed, the new diagnostics log file resides at the top of the File Name column in the table. To verify, check its timestamp (using its date and time), to ensure this is the latest diagnostics file created.

NOTE: When you generate a diagnostics log file bundle, it contains all of the DR Series system information that may be needed when contacting Dell Support for technical assistance. This also includes all the previous auto-generated diagnostics log files, which are then deleted from the DR Series system.

The diagnostics log file bundle collects the same type of hardware, storage, and operating system information collected by the Dell System E-Support Tool (DSET) from the Dell DR Series system appliance hardware:

- To collect a DSET log file, use the DR Series system CLI command, **diagnostics --collect --dset**.
- To collect the comprehensive DR Series system diagnostics log file bundle (which also includes DSET information), use the DR Series system CLI command, **diagnostics --collect**.

System diagnostics information can assist Dell Support when troubleshooting or evaluating your DR Series system.

Downloading Diagnostics Log Files

To display the **Diagnostics** page and open or download an existing diagnostics log file, complete the following:

1. Click **Support**→ **Diagnostics** in the navigation panel.
   The **Diagnostics** page is displayed, which lists all current diagnostics log files allowed by the system.
2. Click **Select** to identify the diagnostics log file you want to download, and click **Download** (or single-click the diagnostics log file name link).
   The **File Download** dialog is displayed.

   NOTE: When a new diagnostics log file is in the process of being generated (and its **Status** displays as In-progress), the diagnostic log file name link is not active, and if you attempt to select this file the **Download** option is disabled.
3. Download the file to the desired location, depending upon the following:
   a) If accessing the DR Series system GUI from a Linux-based system: click **Save File** and navigate to a different folder location, define a new file name (or retain the existing file name), and click **Save** to save the diagnostics log file to a specified folder location.
   b) If accessing the DR Series system GUI from a Windows-based system: click **Save** (or **Save As**), and navigate to the **Downloads** folder and retrieve the diagnostics log file.

Deleting a Diagnostics Log File

To delete an existing diagnostics log file from the Diagnostics summary table on the **Diagnostics** page, complete the following:

1. Select **Support** → **Diagnostics**.
   The **Diagnostics** page is displayed.
2. Click **Select** to select the diagnostics file you want to delete, and click **Delete**.
   The **Delete Confirmation** dialog is displayed.
3. Click **OK** to delete the selected diagnostics log file (or click **Cancel** to display the **Diagnostics** page).
   The **Log file was removed successfully** dialog is displayed when successful.

DR Series System Software Upgrade

When you initiate a DR Series system software upgrade, the navigation panel displays only the **Support** page and the **Software Upgrade** options.

The administrator that initiated the software upgrade (considered the initiator administrator) will see a System Information pane that displays an alert that reads *IMPORTANT: Please do not navigate out of this screen until the upgrade is finished*, and displays the upgrade status as *Upgrade in Progress... Please wait....* The Current Version and Upgrade History versions of the DR Series system software are listed in the **Software Info** pane.

All other administrators that may be logged into DR Series system (with the exception of the initiator administrator who started the software upgrade), will only see a dialog that displays *Status: The system is being upgraded. Wait for it to become operational.*.

There are only three possible outcomes during a DR Series system software upgrade operation:

- The upgrade operation completed successfully—no reboot is required.
- The upgrade operation completed successfully—but a reboot is required (click **Reboot** in the **Software Upgrade** page).
- The upgrade operation failed.

Software Upgrade Page and Options

Use the **Software Upgrade** page to verify the current installed version of the DR Series system software in the **Software Information** pane, or to apply updates to the system. There are two methods you can use to display the **Software Upgrade** page:

- Using the **Support** page, click **Software Upgrade**.
- Using the navigation panel, select **Support** → **Software Upgrade**.

Both methods display the **Software Upgrade** page where you can verify the current installed version, check the upgrade history of previously installed software versions, verify the iDRAC IP address (if one is in use), start the upgrade process, or reboot the DR Series system using the options on this page.

NOTE: During the DR Series system software upgrade, the upgrade status "starting" remains displayed during almost the entire duration of the software upgrade process. It is not until the DR Series system upgrade status changes to "almost done" that the system upgrade process has fully completed.

Verifying the Current Software Version

To verify the currently installed version of the DR Series system software, complete the following:

NOTE: You can verify the version of the installed DR Series system software in the **Dashboard** page (in the System Information pane), the **Support** page (in the Support Information pane), and the **Software Upgrade** page (in the Software Information pane).

The following procedure documents the process from the **Software Upgrade** page.

1. In the navigation panel, select **Support** and click **Software Upgrade** (or select **Support→ Software Upgrade**.

   The **Software Upgrade** page is displayed.
2. Verify the currently installed DR Series system software version listed as **Current Version** in the Software Information pane (all previously installed versions are listed under **Upgrade History**, showing the version number and timestamp when installed).

Upgrading the DR Series System Software

To upgrade the DR Series system software, complete the following:

NOTE: The DR Series system only supports the copying of upgrade images and diagnostics files to and from the system using WinSCP. The DR Series system does not support the copying or deleting of any other file types using WinSCP. To use WinSCP to copy DR Series software upgrade and diagnostics log files, ensure that the File Protocol mode is set to SCP (Secure Copy) mode.

NOTE: You can use other SCP tools with the DR Series system, but you cannot use these other SCP tools to copy other types of files to or from the DR Series system.

1. Using the browser, go to **support.dell.com**, navigate to the DR4000 product page, and enter your service tag.
2. In the Dell DR Series **Drivers & Downloads** page, click **Find Drivers & Downloads**.

   The **Drivers & Downloads** page displays a listing of downloadable firmware, utilities, applications, and drivers for the DR Series system.
3. Locate the IDM section of the **Drivers & Downloads** page, which includes the Dell-Utility (DR Series Upgrade File) in the format, **DR4x00-x.x.x.x-xxxxx.tar.gz**, and showing its release date and version.
4. Click **Download File**, click **For Single File Download via Browser**, and click **Download Now**.

   The **File Download** dialog is displayed.
5. Click **Save** to download the latest system software upgrade file to the DR Series system that is running the browser session started by the DR Series administrator.
6. Using the DR Series system GUI, select **Support**, and click the **Software Upgrade** link (or select **Support → Software Upgrade**).

   The **Software Upgrade** page is displayed.
7. Type the path of the software upgrade file in the **Select the upgrade file from local disk** (or click **Browse...**, and navigate to the location where you downloaded the system software upgrade file).
8. Select the software upgrade file, and click **Open**.
9. Click **Start Upgrade**.

   When you initiate a DR Series system software upgrade, the navigation panel displays only the **Support** page and the **Software Upgrade** option.

   The administrator that initiated the software upgrade (known as the initiator administrator) sees a System Information pane that displays an alert and upgrade status, and the Current Version and Upgrade History versions of the DR Series system software listed in the Software Info pane as shown in Figure 1.

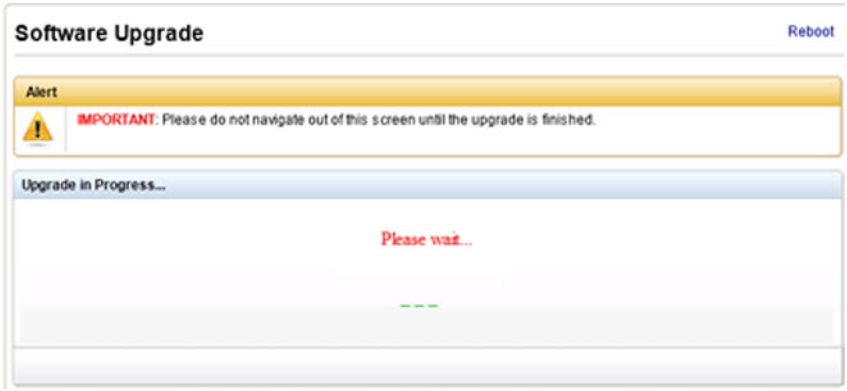


Figure 6. Software Upgrade Alert - Upgrade in Progress

All other administrators that may be logged into DR Series system (excluding the initiator administrator), only see the following dialog displayed (Figure 2):

Figure 7. DR Series System Upgrade Status

There are only three possible outcomes during a DR Series system software upgrade operation:

- Upgrade has completed successfully—no reboot is required.
- Upgrade has completed successfully—but a reboot is required (click **Reboot** in the **Software Upgrade** page).
- Upgrade has failed.

NOTE: If the DR Series system software upgrade operation fails, you can reboot the system and attempt another software upgrade operation using the DR Series system GUI. If this is unsuccessful, you can use the DR Series system CLI **system --show** command to view the current System State status. DR Series system software upgrades can also be performed using the DR Series system CLI. For details, see the *Dell DR Series System Command Line Reference Guide*. If both the DR Series system GUI and CLI attempts are unsuccessful, contact Dell Support for assistance.

Restore Manager (RM)

The Dell **Restore Manager** (RM) utility can be used to restore the DR Series system software. RM can be used when a non-recoverable hardware or software failure prevents the DR Series system from functioning correctly.

RM can also be used to reset the system back to its initial factory settings when moving it from a test environment to a production environment. RM supports the following two modes:

- **Recover Appliance**—in a Recover Appliance mode, RM reinstalls the operating system and attempts to recover the prior system configuration and the data residing in the containers.
- **Factory Reset**—in a Factory Reset mode, RM reinstalls the operating system and resets the system configuration back to the original factory state. It is important to note that when doing a factory reset, all of the containers and the data in the containers gets deleted.

CAUTION: Using the Factory Reset mode deletes all of the DR Series system data. The Factory Reset mode must only be used when the container data is no longer needed.

Downloading the Restore Manager

The Dell **Restore Manager** (RM) utility runs from a USB boot key that contains the RM image, which must first be downloaded from the Dell Support site.

1. Using a supported web browser, navigate to **support.dell.com**.
2. Enter the DR4100 system Service Tag to be directed to the DR Series system download page (or choose a product category).
3. Navigate to the **Drivers & Downloads** page.
4. In the **Category** drop-down list, select **IDM**.
5. If required, expand the **IDM** category to list the available IDM download files.
6. Locate, select, and download the **DR4000 Restore Manager** file (listed in the following RM filename format, "DR4000-UM-x.x.x.xxxxx.tag.gz").

Creating the Restore Manager USB Key

To create a Restore Manager (RM) USB key, you must first download the RM image (.img) file from the Dell Support site, and then transfer this on to a USB key. The USB key must be a minimum of 4 GB (Gigabytes) in size or larger. Windows USB image tools can be used to transfer the RM image when they meet the following conditions:

- Support using the .img file format
- Support using a direct block-to-block device copy to ensure that the USB key is bootable

To transfer the RM image to the USB key on a Linux or Unix system, perform the following:

1. Copy the downloaded RM image file to a Linux or Unix system.
2. Insert the USB key into an available USB port on the Linux or Unix system.
   Make note of the device name that is reported by the operating system (for example, **/dev/sdc4**).
3. Do not locally mount the USB device to a file system at this time.
4. Copy the RM image to the USB key using the **dd** command:
   dd if=<path to .img file> of=<usb device> bs=4096k
   For example:
   dd if=/root/DR4100-UM-04.49.01.00.00.34555.img of=/dev/sdc4 bs=4096

Running the Restore Manager (RM)

To run the Dell **Restore Manager** (RM) utility, boot the DR Series system using the RM USB key created in Creating the RM USB key).

1. Insert the RM USB key into an available USB port on the system.
   You can also use the virtual media option of iDRAC to remotely load the RM USB key. For more information, see *Configuring and Using Virtual Media in the Integrated Dell Remote Access Controller 6 (iDRAC6) User Guide* at **support.dell.com/support/edocs/software/smdrac3/**.
2. Boot the DR Series system using the RM USB key.
3. During the time when the Power-On Self-Test (POST) screen displays, press **F11** to load the Boot Manager.
4. Within the Boot Manager, navigate to the system hard drive (C:), select the USB key as the boot device, and press **<Enter>**.

5. After a few minutes, **Restore Manager** loads and displays its main screen.
6. Select the desired Restore mode (either **Recover Appliance** or **Factory Reset**).
7. Enter the confirmation string, and press **<Enter>** to proceed.

CAUTION: The Factory Reset mode deletes all DR Series data. The Factory Reset mode should only be used when the container data is no longer needed.

NOTE: After **Restore Manager** completes, only the administrator account will remain enabled. To re-enable the root or service accounts, see the DR Series system CLI **user --enable --user** command in the *Dell DR Series System Command Line Reference Guide*.

NOTE: If you had previously joined the DR Series system to any Active Directory Services (ADS) domain before running **Restore Manager**, after it completes you will need to manually rejoin the desired ADS domain. For information about joining an ADS domain, see Configuring Active Directory Settings.

Resetting the Boot LUN Setting in H700 BIOS After Running RM

In the event that both of the 2.5-inch 300 GB 10K RPM 6 GB/s SAS internal drives (OS) in RAID1 are replaced, you need to be able to run the Dell **Restore Manager** (RM) utility to recover the DR Series system OS drives.

Following the RM recovery process, the boot logical unit number (LUN) has to be reset to VD0 RAID1. The DR Series system unsuccessfully attempts to boot from RAID6 instead of RAID1.

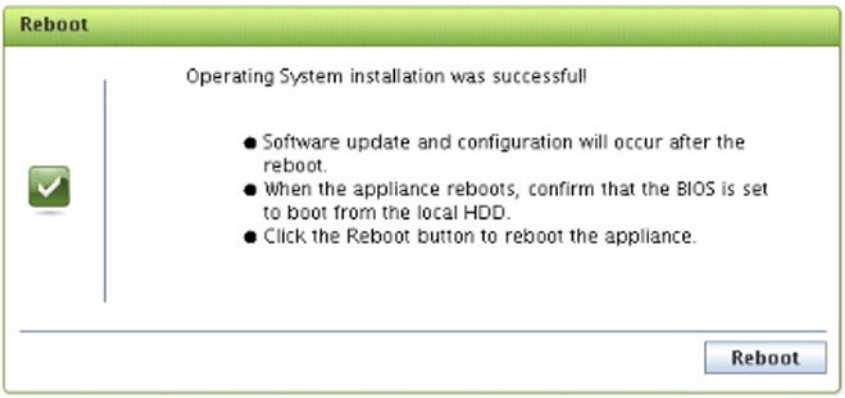
To resolve this issue, reset the H700 BIOS to revise the proper boot order setting to configure the proper boot LUN to be RAID1. To reset the proper LUN boot order, complete the following steps:

1. Start **Restore Manager**.
2. Select **Option 1 → Recover My Appliance**.
   The **OS Virtual Disk is created: Warning Code 2002** dialog is displayed.

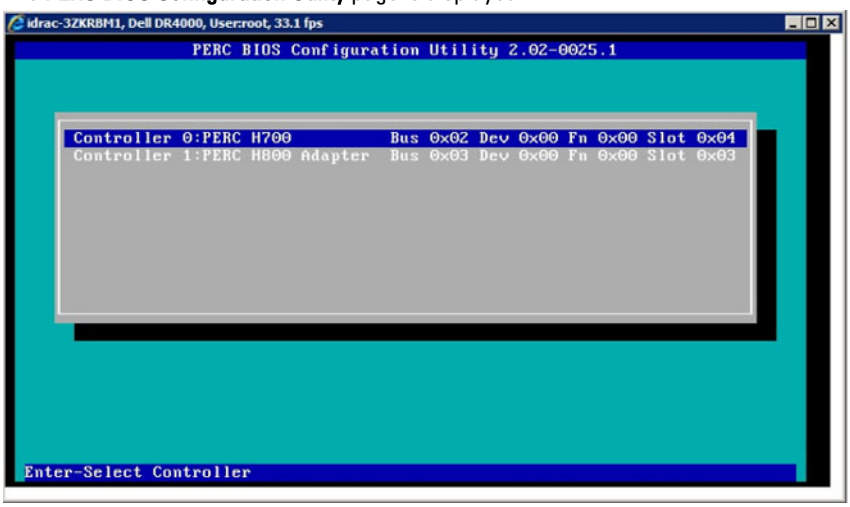
Warning
OS Virtual Disk will be created : Warning Code 2002
This application will attempt to create a new OS virtual disk, make sure to enable the boot flag for the RAID 1 Virtual Disk using the RAID Configuration Utility during system startup at the next reboot.
Cancel
Proceed

3. Click **Proceed**.

The **Operating System installation was successful** dialog is displayed.


Reboot
Operating System installation was successfull
Software update and configuration will occur after the reboot.
When the appliance reboots, confirm that the BIOS is set to boot from the local HDD.
Click the Reboot button to reboot the appliance.
Reboot

4. Click **Reboot**, and during reboot, press **Ctrl+R** to enter the PERC BIOS.
   The **PERC BIOS Configuration Utility** page is displayed.


idrac-3ZKRBM1, Dell DR4000, User:root, 33.1 fps
PERC BIOS Configuration Utility 2.02-0025.1
Controller 0:PERC H700 Bus 0x02 Dev 0x00 Fn 0x00 Slot 0x04
Controller 1:PERC H800 Adapter Bus 0x03 Dev 0x00 Fn 0x00 Slot 0x03
Enter-Select Controller

5. Select **Controller 0: PERC H700** in the list.
6. Press **Ctrl+N** twice to select the **Ctrl Mgmt** (Controller Management) tab.

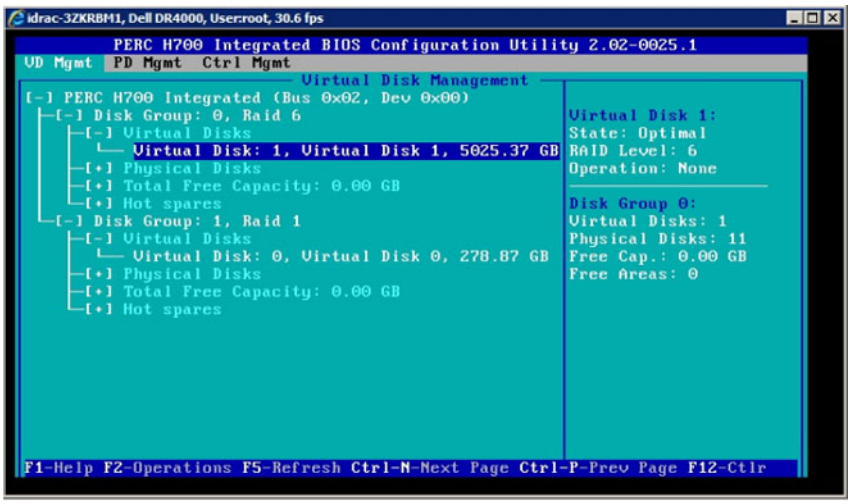

idrac-3ZKRBM1, Dell DR4000, User:root, 30.6 fps
PERC H700 Integrated BIOS Configuration Utility 2.02-0025.1
VD Mgmt PD Mgmt Ctrl Mgmt
Virtual Disk Management
[-] PERC H700 Integrated (Bus 0x02, Dev 0x00)
[-] Disk Group: 0, Raid 6
[-] Virtual Disks
Virtual Disk: 1, Virtual Disk 1, 5025.37 GB
[+] Physical Disks
[+] Total Free Capacity: 0.00 GB
[+] Hot spares
[-] Disk Group: 1, Raid 1
[-] Virtual Disks
Virtual Disk: 0, Virtual Disk 0, 278.87 GB
[+] Physical Disks
[+] Total Free Capacity: 0.00 GB
[+] Hot spares
Virtual Disk 1:
State: Optimal
RAID Level: 6
Operation: None
Disk Group 0:
Virtual Disks: 1
Physical Disks: 11
Free Cap.: 0.00 GB
Free Areas: 0
F1-Help F2-Operations F5-Refresh Ctrl-N-Next Page Ctrl-P-Prev Page F12-Ctlr

Figure 8. Virtual Disk Management

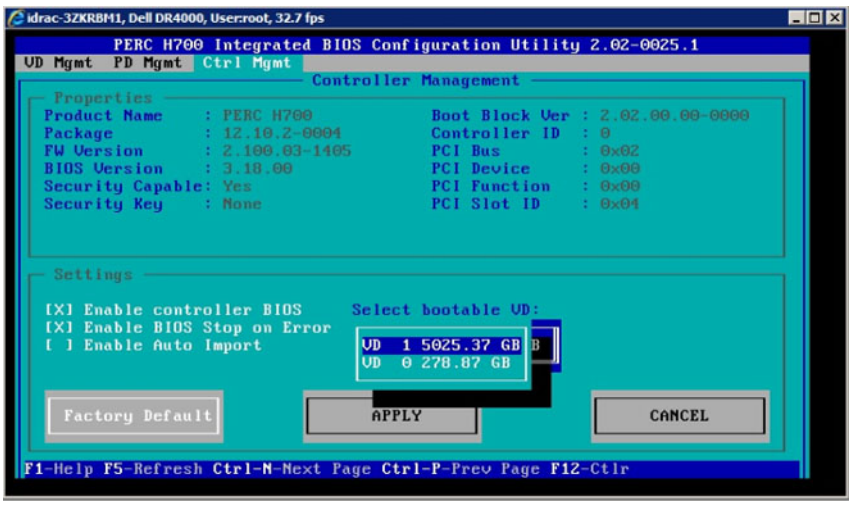


Figure 9. Selecting Bootable Virtual Disk (VD)

7. Select **Ctrl Mgmt**, click **Select bootable VD**, and select **VD 0** as the VD0 RAID1.
8. Click **Apply**, and reboot the DR Series system.
   The **RM Recover My Appliance** mode process will then complete.

Hardware Removal or Replacement

To properly remove or replace any DR Series system hardware, you must observe and use the best practice shut down and start up procedures. For a comprehensive set of removal and replacement procedures with step-by-step instructions, see the *Dell DR Series System Owner's Manual*.

For more information about the best practices, see DR Series System: Proper Shut Down and Start Up and Shutting Down the DR Series System.

DR Series System: Proper Shut Down and Start Up

Before you attempt to remove or replace any hardware component in the DR Series system, ensure that you observe the following best practices for properly shutting down and starting up the system:

1. Power off the DR Series system by selecting **Shutdown** in the **System Configuration** page.
   For more information, see Shutting Down the DR Series System. Another method you can use to shut down the system is the DR Series system CLI command, **system --shutdown**.
2. Allow the DR Series system to fully complete its power-down process.
   When the power-down process has completed, the Power Supply status indicator is unlit.
3. Disconnect the DR Series system power cables from the electrical power outlet.
4. Wait an additional period of time (up to 10 minutes), and/or verify that all of the green and amber NVRAM LEDs on the rear panel of the system chassis are unlit.

   NOTE: If you do not allow the NVRAM super capacitor sufficient time to discharge, the NVRAM status will report **DATA LOSS** when the DR Series system is subsequently powered up.
5. Unlatch the latch release lock and slide the DR Series system cover back and away to gain entry to the appliance internal components.
   To gain entry to the interior of the DR Series system, remove the cover. For more information, see the procedures in the *Dell DR Series System Owner's Manual*.
6. Remove and replace the system hardware components as needed.
7. Replace the cover, reconnect the system power cables to the electrical power outlet.
8. Power on the DR Series system by pressing the power-on indicator/power button.

DR Series System NVRAM

NVRAM is a field replaceable unit (FRU) in the DR Series system. The super capacitor that powers the NVRAM double-data rate (DDR) memory must be able to move its contents to the solid-state drive (SSD) during a power loss.

This data transfer requires maintaining the power to run the system for 3 minutes of operation (normally, it only takes approximately one minute). If a problem occurs during the data backup to the SSD, the subsequent system reboot detects this. NVRAM can experience backup failure when the following occurs:

- The NVRAM failed to backup the data during the power shutdown
- The super capacitor did not maintain sufficient power to backup the DDR contents into the SSD.
- The NVRAM/SSD encountered an end-of-line (EOL) or another error.

If any of these conditions occur, the NVRAM requires either a failure recovery or a replacement.

NOTE: Dell recommends the following supported method for flushing DR Series system data from the NVRAM to the RAID6 before replacing the NVRAM by using either of the following DR Series system CLI commands: **system --shutdown** or **system --reboot**.

NOTE: If you need to remove or replace the NVRAM in the DR Series system, see Shutting Down the DR Series System and NVRAM Field Replacement.

NVRAM Backup Failure Recovery

After you have physically replaced the NVRAM card in a PCIe x4 (or x8) slot in the DR Series system chassis, you can recover from an NVRAM backup failure by completing the following tasks:

CAUTION: You must wait a minimum of 20 minutes after powering on the DR Series system before using the DR Series system CLI maintenance --hardware --reinit_nvram command. This 20–minute post power-on waiting period allows the NVRAM card, the super capacitor calibration, and all solid state drive (SSD) processes to fully complete, which are necessary for the proper operation of the DR Series system.

During Maintenance mode, the DR Series system determines, detects, and repairs the data loss. During the system reboot process, it ensures that no valuable data remains on the NVRAM.

1. Enter the following DR Series system CLI command: **maintenance --hardware --reinit_nvram**.
   This formats the SSD and clears all of the backup and restore logs, by reinitializing the NVRAM.
2. Verify that the DR Series system enters its Maintenance mode.
   For more information about replacing the NVRAM, see NVRAM Field Replacement and DR Series System: Proper Shut Down and Start Up.

NVRAM Field Replacement

Whenever the DR Series system NVRAM is replaced in the field, you must observe this best practice procedure:

CAUTION: You must wait a minimum of 20 minutes after powering on the DR Series system before using the DR Series system CLI command: maintenance --hardware --reinit_nvram. This post power-on waiting period allows the NVRAM card, the super capacitor calibration, and the SSD processes to fully complete, which are necessary for the proper operation of the DR Series system.

NOTE: For more information, see DR Series System: Proper Shut Down and Start Up.

1. Verify that the DR Series system software detects the NVRAM as being new to the system.
2. Enter the following DR Series system CLI command: **maintenance --hardware --reinit_nvram**.
   This command initializes the NVRAM, creates new partitions, and updates information used internally by the DR Series system software.
3. Verify that the DR Series system enters its Maintenance mode.
   If properly initialized, the DR Series system will automatically enter Maintenance mode. The filesystem checker examines every blockmap and datastore to determine how much data was lost due to the failed NVRAM.

8

Configuring and Using OST

This topic introduces key OpenStorage Technology (OST) tasks and provides links to other OST-related topics that contain procedures that describe how to perform these tasks:

- Configuring the DR Series system for use with OST and the supported DMAs; for more information, see Configuring the DR Series System Using the Backup Exec GUI, and Configuring DR Series System Information Using NetBackup
- Configuring the Logical Storage Unit (LSU) using the DR Series system GUI; for more information, see Configuring an LSU
- Installing the Dell OST plug-in in to a supported media server (Linux or Windows); for more information, see Installing the OST Plug-In for Linux or Installing the OST Plug-In for Windows
- Using supported Symantec DMAs (NetBackup and Backup Exec) to perform backup and restore operations; for more information, see
  - Backing Up Data from a DR Series System Using NetBackup
  - Restoring Data from a DR Series System Using NetBackup
  - Duplicating Backup Images Between DR Series Systems Using NetBackup
  - Creating Backups on the DR Series System Using Backup Exec
  - Restoring Data from a DR Series System Using Backup Exec
  - Optimizing Duplication Between DR Series Systems Using Backup Exec

NOTE: This capability to use OST, also known as DR Rapid Data Access within Dell, adds tighter integration with backup software applications, such as the two Symantec OpenStorage-enabled backup applications supported in this release: NetBackup and Backup Exec.

Understanding OST

OpenStorage Technology (OST) provides the logical disk interface that can be used with network storage devices, and the DR Series system appliance requires plug-in software to integrate its data storage operations with the following supported data management applications (DMA):

- NetBackup
- Backup Exec

The DR Series system integrates with these supported DMAs using the Dell OpenStorage plug-in, through which both NetBackup and Backup Exec can control when backup images are created, duplicated, and deleted. Via the plug-in, the DMAs can take full advantage of key DR Series system features like replication and data deduplication.

The DR Series system accesses the OpenStorage API code through a Dell OST plug-in, which can be installed on the supported media server platform type that you choose (Windows or Linux). When OST is used with the DR Series system, it offers the following benefits:

- OST protocol provides faster and improved data transfers:
  - Focus is on backups with minimal overhead
  - Accommodates larger data transfer sizes
  - Provides throughput that is significantly better than CIFS or NFS

- OST and DMA integration:
  - OpenStorage API enables the DMA-to-media server software communication
  - DR Series system storage capabilities can be used without extensive changes to DMAs
  - Backup and replication operations are simplified by using built-in DMA policies
- DR Series system and OST ports and write operations:
  - Control channel uses TCP port 10011
  - Data channel uses TCP port 11000
  - Optimized write operations enable client-side deduplication
- Replication operations between DR Series systems:
  - No configuration is required on the source or target DR Series system
  - Replication is file-based, not container-based
  - Replication is triggered by DMA optimized duplication operation
  - DR Series system transfers the data file (not the media server)
  - Once duplication completes, DR Series system notifies DMA to update its catalog (acknowledging the second backup)
  - Supports different retention policies between source and replica
  - Replication is set up in the DMA itself, not the DR Series system

OpenStorage Technology (OST) API

The OpenStorage Technology (OST) API is an application programming interface that allows disk-based devices like the DR Series system to natively integrate with the two supported Symantec Data Management Applications (DMA), NetBackup and Backup Exec. For example, because the DR Series system supports both data deduplication and replication, the OST API allows these supported DMAs to use the DR Series system appliance features and duplicate the optimized data from one storage appliance to another.

The OST API enables the writing of data to disk and is illustrated in the following example where NetBackup (the DMA) interacts with the DR Series system (the data backup and deduplication device) using the OST API:

- NetBackup needs to store a file to disk. To do this it notifies the DR Series system via the OST API which file it needs to backup and what to name this file.
- DR Series system accepts this file, backs it up, and stores it in its filesystem.
- NetBackup can perform one of three subsequent operations with this specific stored file:
  - Expire it
  - Restore from it
  - Copy or duplicate it
- If NetBackup, using the OST API, directs the DR Series system to expire a stored file, it deletes it from its filesystem.
- Similarly, if NetBackup, using the OST API, wants to restore from a stored file, it directs the DR Series system which file to restore, which then delivers the stored file to NetBackup for the restore.

NOTE: OST contains a feature called optimized duplication. For example, in optimized duplication, the DMA (NetBackup) directs device A to perform an optimized duplication with device B. Device A and B communicate and determine which data segments of the file need to be replicated from A to B for device B to ensure that device B contains a full and complete duplicate data file. Once successful, the DMA now knows about both copies of this data file, and can use this file on device B as it would any other data file that resides there.

OST Guidelines

For best results, observe the following guidelines for optimal performance with your supported OpenStorage Technology (OST) operations with the DR Series system:

- Backup, restore, and optimized duplication operations need to be performed via the Dell OST plug-in

  NOTE: The Dell OST plug-in needs to be installed on client systems to support client-side deduplication.

- Optimal supported aggregated throughput rates:
  - 3 Terabytes per hour (TB/hr) for passthrough write operations
  - 4 TB/hr for optimized write operations

  NOTE: Passthrough writes are when data is sent from a media server to the DR Series system without applying any optimization to the data. By contrast, optimized writes are when date is sent from a media server to the DR Series system after optimization is applied to the data.

- Backup:
  - Passthrough writes
  - Optimized writes
- Restore
- Replication

OST Terminology

This topic introduces and briefly defines some basic OpenStorage Technology (OST) terminology used throughout the DR Series system documentation.

Term	Description
BE	Shortened name for the Symantec DMA, Backup Exec (BE).
DMA/DPA	Data Management Application (also known as Data Protection Application, which are terms for the role played by the Symantec NetBackup or Backup Exec applications.
LSU	Logical Storage Unit, which from the DR Series system perspective, represents any container created for data storage. *LSU* is a common storage term while *container* is a common term in DR Series systems that represents a location for storing data.
media server	This is the host running the DMA media server (NetBackup and Backup Exec), and is where the OST plug-in is installed. The OST plug-in can also be installed on a NetBackup client.
NBU	Shortened name for the Symantec DMA, NetBackup (NBU).
OST	The OpenStorage Technology from Symantec™, which allows storage devices to deliver backup and recovery solutions with NetBackup. OST uses the OpenStorage API and a plug-in installed on either a Linux or a Windows-based media server platform.

Supported OST Software and Components

This topic provides a brief listing of some of the supported OST software and components that can be used with the DR Series system.

NOTE: For the latest list of supported DMAs and OST plug-ins, see the *Dell DR Series System Interoperability Guide*, which is available at **support.dell.com/manuals**.

Supported OST Software and Components

Software or Component	Description
OST Server Components	
Media Server	Component resides on the DR Series system
• Linux installations	• Uses a Linux OST plug-in and the Red Hat Package Manager (RPM) installer
• Windows installations	• Uses a Windows OST plug-in and the Microsoft installer (MSI)
OST Plug-In Component	
Windows-based 64–bit	Supported releases: • Windows 2003 • Windows 2008 • Windows 2008, Release 2
Linux-based 64–bit	Supported releases: • Red Hat Enterprise Linux (RHEL), version 5.x • RHEL, version 6.x • SUSE, version 10 and 11
OST Protocol	
Symantec OpenStorage	Supported releases: • Symantec, versions 9 and 10
Supported DMAs	
Symantec (Linux and Windows 64–bit versions)	Supported releases: • NetBackup – Versions 6.5, 7.1, and 7.5 (Windows 2003, 32–bit) – Version 7.5 (Windows 2008, 32–bit) – Version 7.5 (Windows 2008 R2, 64–bit) – Version 7.1 (RHEL 5.x) – Version 7.5 (SLES 11 SP2, 64–bit) • Backup Exec

- Version 2010 R3 (Windows 2008 R2, 64–bit)
- Version 2012 (Windows 2008 R2, 64–bit)

NOTE: The Dell DR Series system licensing is all-inclusive, so that no additional Dell licensing is required to use OST or the optimized duplication capability. The Dell OST plug-in that gets installed on a supported Linux or Windows media server platform is a free download from Dell. However, Symantec NetBackup requires that you purchase a Symantec OpenStorage Disk Option license. Similarly, Symantec Backup Exec requires that you purchase the Deduplication Option to enable the OST feature.

OST Required Configurations

This topic introduces three possible required configurations that must be made to enable OpenStorage Technology (OST) operations: DR Series system and a DMA-based media server or client (for example, OST operations that support a NetBackup-media server, a Backup Exec-media server, or a Backup Exec-client).

Best Practices: OST and the DR Series System

This topic introduces some recommended best practices for using OpenStorage Technology (OST) operations with the DR Series system.

- OST and non-OST containers can exist on the same DR Series system. The DR Series system supports having both OST and non-OST containers on the same appliance. However, this can cause incorrect capacity reporting as both container types share the same underlying storage.
- OST replication and non-OST replication on the same DR Series system. Non-OST replication needs to be configured, and it is replicated on a per-container basis. However, this type of replication will not replicate OST containers. OST replication is file-based and is triggered by the DMA.
- Do not change the container connection type from NFS/CIFS to OST. A non-OST container must be deleted before this container can then be created as an OST container using the same name.

Setting Client-Side Optimization

Client-side optimization is a process that can contribute to saving time performing backup operations and reducing the data transfer overhead on the network.

You can turn On or turn Off client-side optimization (also known as client-side deduplication) using the DR Series system CLI commands, **ost --update_client --name --mode**. For more information about DR Series system CLI commands, see the *Dell DR Series System Command Line Reference Guide*, which is available at **support.dell.com/manuals**.

Configuring an LSU

You can configure a logical storage unit (LSU) as an OpenStorage Technology (OST) connection type container for data storage by using the DR Series system GUI. To configure an LSU as an OST connection type container, log in to the DR Series system and complete the following:

1. Navigate to the **Containers** page (in the **Dashboard** navigation panel).
2. Click **Create** to create a new container.
   The **Create New Container** dialog is displayed.
3. In **Container Name**, enter a name for the container.
4. In **Marker Type**, select the **None** marker type.
   For OST operations, only the NetBackup and Backup Exec media servers are supported.
5. In **Connection Type**, set the container type to **OST**.

The OST pane is displayed, and this is where you can set the capacity for the OST connection type container.

6. In **Capacity**, select either the **Unlimited** or **Size** options to set the capacity for the OST connection type container.
   If you select **Size**, make sure to define the desired size in Gibibytes (GiB).
7. Click **Create a New Container** (or click **Cancel** to display the **Containers** page).

NOTE: For general information about creating DR Series system containers, see Creating Containers, and for creating an OST connection type container, see Creating An OST Connection Type Container.

NOTE: The capacity option in this command example sets the quota on the LSU. This is the maximum number of bytes (ignoring optimization) that can be written to an LSU and it is listed in the gigabytes (GB). If the capacity option is not specified (or if 0 is specified for the capacity), then the LSU will not have a quota. If this is the case, then this means that the amount of data that can be written to the LSU is limited only by the amount of free space on the disk.

Installing a Dell OST Plug-In

Before you can start the installation process for the Dell OST plug-in, you need to understand its role. The Dell OST plug-in needs to be installed on to the media server type you choose (this DR Series system release supports Linux and Windows). The Dell OST plug-in software enables integration between DR Series system data storage operations and the supported data management applications (DMAs).

Understanding the Dell OST Plug-In (Linux)

The Dell OST plug-in needs to be installed on the designated Linux-based media server running the support Linux server operating system software in the following directory, **/usr/openv/lib/ost-plug-ins**. The Dell OST plug-in is installed using a self-extracting installer that installs the OST plug-in and all its related components. The installer supports the following modes, with the default being Help (-h):

NOTE: If no option is selected, the Help mode is displayed by default.

- Help (-h)
- Install (-install)
- Upgrade (-upgrade)
- Uninstall (-uninstall)
- Force (-force)

```
$> ./Dellostplugin-x86_64-38105.bin -help
Dell plug-in installer/uninstaller
usage: Dellostplugin-x86_64-38105.bin [ -h ] [ -install ] [ -uninstall ]
-h              : Displays help
-install        : Installs the plug-in
-upgrade             : Upgrades the plug-in
-uninstall      : Uninstalls the plug-in
-force                    : Forces the installation of the plug-in
```

You can download the Dell OST Plug-In Installer in two ways:

- Using the Dell website:
  - Navigate to **support.dell.com/** and locate the Drivers and Downloads location
  - Locate the Dell OST plug-in for Linux and download this to your system.
- Using the DR Series system GUI:
  - Click **Storage** → **Clients**

- Click the **OST** tab in the **Clients** page, and click **Download Plug-In**
- Select the appropriate plug-in in the **Download Plug-Ins** page, and click **Download**

Once downloaded, run the Dell OST Plug-In Installer to install the plug-in on your designated Linux-based media server. For specifics, see Installing the OST Plug-In for NetBackup on Linux.

NOTE: The Dell OST plug-in needs to be installed on client systems to support client-side deduplication.

Understanding the Dell OST Plug-In (Windows)

This Dell OST plug-in needs to be installed in the following directory on the designated Windows-based media server running the supported Microsoft Windows server operating system software: **$INSTALL_PATH\VERITAS\Netbackup\bin \ost-plug-ins** for NetBackup installations, and **$INSTALL_PATH\Symantec\Backup Exec\bin** for Backup Exec installations. Once downloaded, you can use **SETUP** to install the Dell OST plug-in. For specifics, see Installing the OST Plug-In for Backup Exec on Windows or Installing the OST Plug-In for NetBackup on Windows.

NOTE: The Dell OST plug-in needs to be installed on client systems to support client-side deduplication.

Installing the OST Plug-In for Backup Exec on Windows

This topic describes how to install the Dell OpenStorage Transport (OST) plug-in within a Microsoft Windows environment for performing DR Series system operations via the plug-in.

Make sure that you meet all of the following prerequisites prior to attempting to install the OST plug-in:

NOTE: The Dell OST plug-in needs to be installed on client systems to support client-side deduplication.

1. The Backup Exec installation must be running on one of the supported Windows media server platforms.
2. The Windows OST installer must be present. If not, download the Windows installer (DellOSTPlug-in.msi), which is available at **support.dell.com/drivers**, to a network directory location you can access.

Version 2.0.0 of the OST plug-in supports the following versions of Backup Exec: Backup Exec 2010 (Release 3), Backup Exec 2012, Backup Exec 12.5. Version 2.0.0 of the OST plug-in supports the following Windows-based media servers: Windows 2003, Windows 2008, and Windows 2008 (Release 2).

NOTE: For the latest information on supported versions, see the *Dell DR Series System Interoperability Guide*, available at **support.dell.com/manuals**.

To install the Dell OST plug-in, complete the following:

1. Launch the **Backup Exec Administrator** console, select **Tools**, and **Backup Exec Services...**.
   The **Backup Exec Services Manager** page is displayed.
2. Select the server on which you want to install the Dell OST plug-in, and select **Stop all services**.
   The **Restarting Backup Exec Services** page is displayed, which lists the current status of services for the selected server.
3. Click **OK**.
4. Launch the **Dell Storage Plug-In for Symantec OST Setup Wizard** (and accept all default values).
5. In the **Welcome** page, click **Next** to continue.
   The **End-User License Agreement** page is displayed.
6. Click **I accept the terms in the License Agreement**, and click **Next**.
7. In the **Destination Folder** page, accept the default destination location, and click **Next**.
8. In the **Ready to Install Dell Storage Plug-In for Symantec OST** page, click **Install**.

When the plug-in has been installed, the **Completed the Dell Storage Plug-In for Symantec OST Setup Wizard** page is displayed.

9. Click **Finish** to exit the wizard.

Installing the OST Plug-In for NetBackup on Windows

This topic describes how to install the Dell OST plug-in on a media server running the supported Microsoft Windows server operating system software (and using the NetBackup DMA).

Ensure that you have downloaded the Dell OST plug-in installer into the correct directory on the designated media server. The OST plug-in installer is saved as DellOSTPlugin64.msi, or DellOSTPlugin.msi (DellOSTPlugin64.msi is for 64-bit operating systems and DellOSTPlugin.msi is for 32-bit operating systems). Please ensure that the correct plug-in is downloaded to support your 64-bit or 32-bit systems.

NOTE: The Dell OST plug-in needs to be installed on client systems to support client-side deduplication.

1. Stop the NetBackup services if they are running, by using the following command:
   Verify if a previous version is already installed. If it is, uninstall it. If **SETUP** performs this check, there is no need to do it manually.
   `$INSTALL_PATH\VERITAS\NetBackup\bin\bpdown.exe`
2. Run **SETUP** to install the OST plug-in.
3. Check that the plug-in is installed by using the following NetBackup command on the Windows media server:
   `$INSTALL_PATH\VERITAS\NetBackup\bin\admincmd\bpstsinfo.exe -pi`

   This NetBackup command lists the Dell OST plug-in details along with other plug-in details, as shown in the following example:

   - Plug-In Name: libstspiDellMT.dll
   - Prefix: DELL
   - Label: OST Plug-in that interfaces with the DR Series system
   - Build Version: 9
   - Build Version Minor: 1
   - Operating Version: 9
   - Vendor Version: Dell OST plug-in 10.1
4. Start the NetBackup services by using the following command:
   `$INSTALL_PATH\VERITAS\NetBackup\bin\bpup.exe`

   NOTE: To more information about uninstalling the Dell OST plug-in, see Uninstalling the Dell OST Plug-In for Windows.

Uninstalling the Dell OST Plug-In for Windows

Use the following uninstall process if you need to uninstall the Dell OST plug-in on a Windows-based media server:

Use the standard Microsoft Windows uninstall process to uninstall the Dell OST plug-in on a Windows-based media server.

NOTE: Dell recommends that you retain the Dell OST plug-in installer on the media server in case you need to use it to reinstall the Dell OST plug-in.

The following procedure is an example of the process for a Windows-based media server with an installed Dell OST plug-in.

1. Click **Start**, and click **Control Panel**.
   The **Control Panel** page is displayed.
2. Under **Programs and Features**, click **Uninstall a program**.
   The **Uninstall or change a program** page is displayed.
3. Locate the Dell OST plug-in in the listed of installed programs, right click and select **Uninstall**.
   The **Programs and Features** confirmation dialog is displayed.
4. Click **Yes** in uninstall the Dell OST plug-in.

Installing the OST Plug-In for NetBackup on Linux

This topic describes how to install the Dell OST plug-in on a media server running the supported Red Hat Enterprise Linux or SUSE Linux server operating system software (using the NetBackup DMA).

Ensure that you have downloaded the Dell OST plug-in installer into the correct directory on the designated media server. The OST plug-in installer is saved as Dellostplugin-x86_64-xxxxx.bin.gz, where *xxxxx* represents its build number.

NOTE: The Dell OST plug-in needs to be installed on client systems to support client-side deduplication.

1. Unzip the OST plug-in installer file using the following command:
   ```
   $> /bin/gunzip Dellostplugin-x86_64-xxxxx.bin.gz
   ```
2. Configure the executable bit on the OST plug-in installer using the following command:
   ```
   $> /bin/chmod a+x Dellostplugin-x86_64-xxxxx.bin
   ```
3. Stop the NetBackup nbrmms service before using the **-install** option.
   The OST plug-in installer returns an error if the NetBackup nbrmms service is running when attempting to install the OST plug-in.
4. Run the OST plug-in installer using the **-install** option, and install the plug-in using the following command:
   ```
   $> ./Dellostplugin-x86_64-xxxxx.bin -install
   ```
   NOTE: You must stop the NetBackup nbrmms process before installing the Dell OST plug-in. You are also required to use the Dell OST plug-in installer to uninstall the plug-in. The location for installing the Dell OST plug-in is not user-configurable.
5. Once the OST plug-in installer has stopped running, and the system prompt returns, verify that the plug-in has loaded properly by checking the output using the following NetBackup command on the Linux media server:
   ```
   $> /usr/openv/netbackup/bin/admincmd/bpstsinfo -plugininfo
   ```
   This NetBackup command lists the Dell OST plug-in details as shown:
   - Plug-In Name: libstspiDellMT.so
   - Prefix: DELL
   - Label: Dell OpenStorage (OST) Plug-in
   - Build Version: 10
   - Build Version Minor: 1
   - Operating Version: 10
   - Vendor Version: (EAR-2.0.0) Build: 41640
6. Retain the OST plug-in installer on the media server so you can use it if needed to uninstall the plug-in.
   For information about uninstalling the Dell OST plug-in, see Uninstalling the Dell OST Plug-In for Linux.

Uninstalling the Dell OST Plug-In for Linux

Use the following uninstall process if you need to uninstall the Dell OST plug-in on a Linux-based media server:

1. Stop the NetBackup nbrmms service before using the **-uninstall** option.

   The OST plug-in installer returns an error if the NetBackup nbrmms service is running when attempting to uninstall the OST plug-in.
2. Run the OST plug-in installer with the **-uninstall** option, which uninstalls the plug-in, using the following command:

   ```
   $> ./Dellostplugin-x86_64-xxxxx.bin -uninstall
   ```

   NOTE: You must stop the NetBackup nbrmms service before uninstalling the OST plug-in (you are also required to use the Dell OST plug-in installer to uninstall the plug-in).
3. Check that the plug-in is uninstalled by using the following NetBackup command on the Linux media server:

   ```
   $> /usr/openv/netbackup/bin/admincmd/bpstsinfo -plugininfo
   ```

   NOTE: If the **-pluginfo** command returns any Dell OST plug-in details, this means that the plug-in has not been uninstalled.
4. Retain the OST plug-in installer on the media server in case you need to use it to reinstall the plug-in.

Configuring DR Series System Information Using NetBackup

The topic introduces the concept of configuring the DR Series system information using the NetBackup media server command line interface (CLI) commands and graphical user interface (GUI) menus, tabs, and options. The NetBackup CLI commands and GUI menus, tabs, and options allow you to configure both the Linux or Windows media servers. In the *DR Series System Administrator Guide* documentation, you will find specific topics that address operations for using the NetBackup CLI, such as adding the DR Series system name to NetBackup on each Linux and Windows media server you intend to use with the DR Series system, using the NetBackup GUI to configure it to work with the DR Series system via OST, using the NetBackup GUI to configure disk pools from logical storage units (LSUs) on the DR Series system, and using the NetBackup GUI to create storage units using the disk pools on the DR Series system.

Related Links

Configuring NetBackup for the DR Series System
: Use the NetBackup graphical user interface (GUI) to configure it to work with the DR Series system via OST. This process is essentially the same type of operation for either the Linux or Windows platforms.

Configuring the DR Series System Using the Backup Exec GUI
: Backup Exec only supports the use of its own graphical user interface (GUI) for configuring the DR Series system. There is no supported Backup Exec command-line interface (CLI) for using Backup Exec 2010 version.

Using NetBackup CLI to Add DR Series System Name (Windows)
: This topic describes how to use the NetBackup CLI to add the DR Series system name to each Windows-based media server you plan to use with the DR Series system.

Using NetBackup CLI to Add the DR Series System Name (Linux)

This topic describes how to use the NetBackup CLI to add the DR Series system name to each Linux-based media server you plan to use with the DR Series system.

Using NetBackup CLI to Add DR Series System Name (Linux)

This topic describes how to use the NetBackup CLI to add the DR Series system name to each Linux-based media server you plan to use with the DR Series system.

1. Add the DR Series system name to NetBackup by using the following command:

   ```
   /usr/openv/netbackup/bin/admincmd/nbdevconfig -creatests
   -storage_server servername -stype DELL -media_server mediaservername
   ```

2. Log in to and authenticate with DR Series system by using the following command (for details, see Configuring an LSU.

   ```
   /usr/openv/volmgr/bin/tpconfig -add -storage_server servername -stype DELL -
   sts_user_id backup_user -password password
   ```

   NOTE: On the DR Series system, only one user account exists, and the user ID for that account is backup_user. You can only change the password for this account; you cannot create a new account nor can the existing account be deleted.

Using NetBackup CLI to Add DR Series System Name (Windows)

This topic describes how to use the NetBackup CLI to add the DR Series system name to each Windows-based media server you plan to use with the DR Series system.

1. Add the DR Series system name to NetBackup by using the following command:

   ```
   $INSTALL_PATH\VERITAS\NetBackup\bin\admincmd\nbdevconfig
   -creatests -storage_server servername -stype DELL -media_server
   mediaservername
   ```

2. Log in to and add the valid credentials for authentication by the DR Series system by using the following command (for details, see Configuring an LSU).

   ```
   $INSTALL_PATH\VERITAS\Volmgr\bin\tpconfig -add -storage_server servername -
   stype DELL -sts_user_id backup_user -password password
   ```

Configuring NetBackup for the DR Series System

Use the NetBackup graphical user interface (GUI) to configure it to work with the DR Series system via OST. This process is essentially the same type of operation for either the Linux or Windows platforms.

Log in to NetBackup, and complete the following:

1. In the main window of the **NetBackup Administrator** console, click **Configure Disk Storage Servers** to launch the **Storage Server Configuration Wizard**.

   The **Storage Server Configuration Wizard** page is displayed, which is where you can add a storage server.

2. Select **OpenStorage** to choose the type of disk storage that you want to configure in this window, and click **Next**.

   The **Add Storage Server** page is displayed.

3. Enter the following values to configure a storage server:

   - In **Storage server type**, enter **DELL**.
   - In **Storage server name**, enter the name of the DR Series system.
   - In the **Select media server** drop-down list, select the desired media server (the server on which you are configuring OST).

– Enter values for the credential needed to authenticate with the DR Series system:

  * **User name**
  * **Password**
  * **Confirm password**

The credentials should be the same as the credentials that are required for the DR Series system. For more information, see Configuring an LSU.

4. Click **Next**.

   The **Storage Server Configuration Summary** page is displayed, which lists the values you configured.

5. Click **Next**.

   The storage server you configured and the corresponding credentials are displayed in the **Storage Server Creation Status** page.

6. Click **Next** and click **Finish** to close the **Storage Server Configuration Wizard**.

   The **Storage server** *servername* **successfully created page** is displayed. NetBackup is now configured for use with the DR Series system.

Creating Disk Pools from LSUs

Use the NetBackup graphical user interface (GUI) to configure disk pools from logical storage units (LSUs) on the DR Series system.

Log in to NetBackup, and complete the following:

1. In the main window of the **NetBackup Administrator** console, click **Configure Disk Pools** to launch the **Disk Pool Configuration Wizard**.

   The **Disk Pool Configuration Wizard** page is displayed, which is where you define media servers for use in a disk pool.

2. In the **Welcome to the Disk Pool Configuration Wizard** page, click **Next**.

   The **Disk Pool** page is displayed.

3. In **Type**, select **OpenStorage (DELL)**, and click **Next**.

   The **Select Storage Server** page is displayed, and contains a list of available storage servers.

4. In the **Storage server** list, select a server, and click **Next**.

   The **Disk Pool Properties** page is displayed.

5. Select the LSUs (volumes) to include from the list, and click **Next**.

   The **Disk Pool Properties** page is displayed.

6. Enter a **Disk pool name**, and click **Next**.

   The **Summary** page for the **Disk Pool Configuration Wizard** is displayed.

7. Verify the disk pool configuration in the **Summary** page, and click **Next** to configure the disk pool you created.

   The **Performing required task** page is displayed, with the status being: **Configuration completed successfully**. You have several options available at this point:

   – Deselect the **Create a storage unit** for the disk pool.
   – Click **Finish** and close the **Disk Pool Configuration Wizard**.
   – Click **Next** to create the storage unit with this disk pool.

   NOTE: If you create the storage unit using the **Disk Pool Configuration Wizard**, you can skip the step where you create storage units using a disk pool.

8. Click **Next** to continue with creating a storage unit using this wizard.

9. Enter a **Storage unit name**, and click **Next**.
   The **Successfully Completed Disk Pool Configuration** page is displayed.
10. Click **Finish**.

To display the disk pool you created, click **Devices** → **Disk Pools** in the left navigation pane in the **NetBackup Administrator** console.

Creating Storage Units Using the Disk Pool

Use the NetBackup GUI to create storage units using the disk pools on the DR Series system.

Log in to NetBackup, and complete the following tasks:

1. In the main window of the **NetBackup Administrator** console, click **Storage** in the left navigation pane, and select **Storage Units**.
2. In the **NetBackup Administrator** console main window, right-click and select **New Storage Unit** from the drop-down list.
3. In the **New Storage Unit** page, enter a name in **Storage unit name**, and select the OST disk pool that you created in the **Disk pool** drop-down list.
4. Click **OK** to create the new storage unit.

Backing Up Data from a DR Series System (NetBackup)

This topic describes how to use NetBackup to back up data from a DR Series system.

Before backing up data, you first need to configure a policy that creates a backup on the OpenStorage Technology (OST) logical storage unit (LSU). This type of policy is similar to what is done for network-attached storage (NAS) shares, except that when defining policy attributes, you need to select the LSU that contains the OST disk pool.

To back up data from a DR Series system using a policy, complete the following:

1. Log into the **NetBackup Administrator** console.
2. Click **NetBackup Management** in the left navigation pane, and select **Policies**.
3. In the **All Policies** main window, right-click **OST**, and select **Change Policy** from the drop-down list.
   The **Change Policy** page is displayed.
4. In the **Change Policy** page, click the **Attributes** tab, and select the settings for the policy you want to create.
5. Click **OK** to create the policy, which displays under OST in the main window.
6. Right-click the policy, and select **Manual Backup** from the drop-down list.
   The **Manual Backup** page is displayed.
7. In the **Manual Backup** page, enter the name of the media server in **Server**, and click **OK**.

To monitor the status of any backup operation, click **Activity Monitor** in the left navigation pane of the **NetBackup Administrator** console, and select the backup job you are interested in to view details about the operation.

Restoring Data from a DR Series System Using NetBackup

This topic describes how to use NetBackup to restore data from a DR Series system. The process for restoring data from OpenStorage Technology (OST) logical storage units (LSUs) is similar to how restores are performed from any backup device.

To restore data from a DR Series system, complete the following:

1. Log into the **NetBackup Administrator** console.
2. Click **Backup**, **Archive**, and **Restore** in the left navigation pane.
3. In the **Restore** main window, click the **Restore Files** tab.
4. Select the data that you want to restore, and click **OK**.

To monitor the status of any restore operation, click **Activity Monitor** in the left navigation pane of the **NetBackup Administrator** console, and select the restore job you are interested in to view details about the operation.

Duplicating Backup Images Between DR Series Systems Using NetBackup

Using NetBackup with the DR Series system, you can duplicate backup images from a disk pool on one DR Series system to a target disk pool (or a storage unit derived from it) that could be on the same DR Series system or on a different DR Series system.

To duplicate backup images between DR Series systems using NetBackup, complete the following:

1. Log into **NetBackup Administrator** console.
2. Click **NetBackup Management** in the left navigation pane, and select **Catalog**.
3. In the **Catalog** main window, select **Duplicate** from the **Action** drop-down list, and click **Search Now**.
   The **Search Results** pane is displayed, which lists images from which you can choose to duplicate.
4. Right-click to select the image in the **Search Results** pane that you would like to duplicate, and select **Duplicate** in the drop-down list.
   The **Setup Duplication Variables** page is displayed.
5. In the **Setup Duplication Variables** page, select the LSU that is the target DR Series system in the **Storage unit** drop-down list, and click **OK**.

To monitor the status of any duplicate image operation, perform the following:

- Click **Activity Monitor** in the left navigation pane of the **NetBackup Administrator** console
- Select the data duplication job in which you are interested
- View the operation details

Using Backup Exec with a DR Series System (Windows)

This topic introduces the Dell OpenStorage Technology (OST) plug-in and describes its installation prerequisites for Backup Exec within a Microsoft Windows environment. Once installed, Backup Exec can perform DR Series system operations via the OST plug-in.

OST Plug-In and Supported Versions

This topic introduces the version 1.0 of the OST plug-in that supports the following versions of Backup Exec:

- Backup Exec 2010, Release 3
- Backup Exec 2012

Version 1.0 of the OST plug-in supports the following versions of the Windows media server:

- Server 2003
- Server 2008
- Server 2008, Release 2

NOTE: For the latest information, see the *Dell DR Series System Interoperability Guide*, available at **support.dell.com/manuals**.

Installation Prerequisites for the OST Plug-In for Backup Exec

This topic introduces the installation prerequisites for installing the OST plug-in for Backup Exec on Windows media servers. Ensure that you meet the following prerequisites prior to installing the Dell OST plug-in:

1. The Backup Exec installation must be running on one of the supported Windows platforms.
2. Dell recommends that the DR Series system appliance have an OST container created and configured. For details, see Configuring an LSU.
3. The Windows OST installer must be present. If not, download the Windows installer (DellOSTPlug-in.msi), which is available at **support.dell.com/support/drivers**, to a network directory location you can access.
4. The Dell OST plug-in needs to installed in the following directory on the designated Windows-based media server running the supported Microsoft Windows operating system software ($INSTALL_PATH\VERITAS\NetBackup\bin \ost-plugins) for NetBackup installations.

Configuring the DR Series System Using the Backup Exec GUI

Backup Exec only supports the use of its own graphical user interface (GUI) for configuring the DR Series system. There is no supported Backup Exec command-line interface (CLI) for using Backup Exec 2010 version.

To configure the DR Series system using the Backup Exec GUI, complete the following:

1. Launch the **Backup Exec Administrator** console, select **Tools**, and **Backup Exec Services...**.
2. Select the server that you want to configure in the **Backup Exec Services Manager** page, and select **Start all services**.
3. Verify that all services have been started, and click **OK**.
4. In the **Connect to Media Server** page, log into the media server, and enter a **User name**, a **Password**, and click **OK**.
5. In the **Backup Exec Administrator** page, click **Network**, and click **Logon Accounts**.

   The **Logon Account Management** page is displayed.
6. Click **New** to create a new logon account.

   The **Add Logon Credentials** page is displayed.
7. In the **Account Credentials** pane, enter the **User name** and **Password** account credentials for the DR Series system, and click **OK** (for example, the default user name is **backup_user**).
8. In the **Backup Exec Administrator** page, click the **Devices** tab, and right-click on the local system name that is listed as the root node.

   A drop-down list of device-related options is displayed.
9. Select **Add OpenStorage** in the drop-down list.

   The **Add OpenStorage Device** page is displayed.
10. Configure the **Add OpenStorage Device** page with the following information, and click **OK**:
    - **Server**—enter the host name or IP address of the DR Series system.
    - **Logon account**—select the account from the drop-down list, which has credentials for accessing the DR Series system.
    - **Server type**—select the type of plug-in from the drop-down list (DELL OST plug-in).
    - **Logical storage unit**—enter the LSU (DR Series system container) name to use.
11. Click **Yes** in response to the prompt about making the new device the default destination for new jobs.
12. Close the **Add OpenStorage Device** page.

The **Restart Services** confirmation dialog is displayed (this dialog recommends against restarting the services if any jobs are currently running).

13. Click **Restart Now** to restart the Backup Exec services.

Creating Backups on the DR Series System Using Backup Exec

This topic describes how to use Backup Exec to create backups on the DR Series system.

To create backups on the DR Series system using Backup Exec, complete the following:

NOTE: This procedure documents this process using Backup Exec 2010. The procedure for Backup Exec 2012 is different. For specific details and procedures, see the product-specific documentation from Symantec for the specific DMA product and version you are using.

1. Launch the **Backup Exec Administrator** console, and select the **Job Setup** tab.
2. Click **Backup Tasks** in the left navigation panel, and select **New job**.
   The **Backup Job Properties** page is displayed.
3. In the left navigation pane of the **Backup Job Properties** page, select **Source**, and select **Selections**.
   The **Selections** page is displayed.
4. Select the system or node name in the center pane of the **Selections** page, and click the check boxes that correspond to the files you want backed up.
5. In the left navigation pane of the **Backup Job Properties** page, select **Destination**, and select **Device and Media**.
   The **Device and Media** page is displayed.
6. In the **Device** pane in the **Device and Media** page, select the **DELL OST** device in the drop-down list, and click **Run Now** to start the backup job.
7. Click the **Job Monitor** tab to view the progress of the backup job you created.

Optimizing Duplication Between DR Series Systems Using Backup Exec

The Backup Exec DMA can work with the DR Series system to replicate backups between two DR Series systems that are part of a defined source and target replication pair. This process uses the deduplication and replication features of the DR Series system via the OpenStorage Technology (OST).

Using OST, backed up data is catalogued which makes its available from the designated media server so that a seamless restore can be performed from either the target or source DR Series system. This is considered an integrated replication, where the OST appliance does the replication. It is considered to be “optimized” because the data flows from the local appliance directly to the remote appliance in a deduplicated format, and it does not travel through the media server.

When the data is in a deduplicated format (in an optimized form), only new or unique data is copied between the two DR Series systems. Because the duplication job is initiated by Backup Exec, there are two entries in its catalog: one entry is for the source file, while the other entry is for the target file. The backup administrator can restore backup data from either appliance in case of data loss or disaster.

To optimize duplication between DR Series systems, create an additional OST device that points to the target DR Series system, and complete the following:

1. Launch the **Backup Exec Administrator** console, select the **Devices** tab, and right-click the target DR Series system.
2. Select **Add OpenStorage** in the drop-down list.
   The **Add OpenStorage Device** page is displayed
3. Configure the **Add OpenStorage Device** page with the following information:

- **Server**—enter the host name or IP address of the DR Series system.
- **Logon account**—select the account from the drop-down list (or click **...** and browse to the account location), which has credentials for accessing the DR Series system.
- **Server type**—select the type of server from the drop-down list (**DELL**).
- **Logical storage unit**—enter the name of the logical storage unit (LSU), also known as a DR Series system container, to use.

4. Click **Yes** in response to the prompt if you want to make the new device the default destination for new jobs.
5. Close the **Add OpenStorage Device** page.
6. Click the **Job Setup** tab.
7. In the left navigation pane, select **Backup Tasks**, and click **New job** to duplicate backup sets.
   The **New Job to Duplicate Backup Sets** page is displayed.
8. Select **Duplicate existing backup sets**, and click **OK**.
9. Click the **View by Resource** tab in the **Selections** page, and select the dataset you want copied.
10. In the left navigation pane, select **Destination**, and select **Device and Media**.
11. In **Device**, select the destination device from the drop-down list (that was created in this procedure), and click **Run Now** to start the replication operation between the two DR Series systems.

Click the **Job Monitor** tab to view the progress of the replication operation you created.

Restoring Data from a DR Series System Using Backup Exec

This topic describes how to use Backup Exec to restore data from a DR Series system.

To restore data from a DR Series system using Backup Exec, complete the following:

1. Launch the **Backup Exec Administrator** console, and select the **Job Setup** tab.
2. In the left navigation pane, select **Restore Tasks**, and click **New job**.
   The **Restore Job Properties** page is displayed.
3. Click the **View by Resource** tab in the **Selections** pane, and select the dataset to be restored.
4. Click **Run Now** to start the restore job.

Click the **Job Monitor** tab to view the progress of the restore job operation you created.

Understanding the OST CLI Commands

The OpenStorage Transport (OST) **--mode** component supported in the DR Series system command line interface (CLI) command supports three values, which represent optimized writes done via: *deduplication* (**--mode dedupe**), *passthrough* (**--mode passthrough**), and *auto* (**--mode auto**). These OST commands are used in the following format: **ost --update_client --name --mode**.

NOTE: If an OST client has four or more CPUs, it is considered to be dedupe-capable. However, the OST client operating mode depends upon how it is configured in the DR Series system (**Dedupe** is the default OST client mode). If the administrator did not configure an OST client to operate in a specific mode and it is dedupe-capable, it will run in the **Dedupe** mode. If an OST client is not dedupe-capable (meaning the OST client has less than four CPUs), and the administrator sets it to run in the **Dedupe** mode, it will only run in the **Passthrough** mode. If an OST client is set to run in **Auto** mode, the OST client will run in the mode setting determined by the media server. The following table shows the relationship between the configured OST client mode types and the supported client mode based on client architecture type and corresponding number of CPUs.

Table 5. Supported OST Client Modes and Settings

OST Client Mode Settings	32–Bit OST Client (4 or more CPUs)	64–Bit Client (4 or more CPUs)	32–Bit OST Client (Less than 4 CPUs)	64–Bit OST Client (Less than 4 CPUs)
Auto	Passthrough	Dedupe	Passthrough	Passthrough
Dedupe	Not Supported	Supported	Not Supported	Not Supported
Passthrough	Supported	Supported	Supported	Supported

Supported DR Series System CLI Commands for OST

The following are the supported DR Series system CLI commands for OST operations:

```
administrator@acme100 > ost
Usage:
   ost --show [--config]
              [--file_history] [--name <name>]
              [--clients]
              [--limits]

   ost --setpassword
   ost --delete_client --name <OST Client Hostname>

   ost --update_client --name <OST Client Hostname>
       --mode <auto|passthrough|dedupe>

   ost --limit --speed <<num><kbps|mbps|gbps> | default>
       --target <ip address | hostname>

   ost --help

ost <command> <command-arguments>
<command> can be one of:
   --show            Displays command specific information.
   --setpassword     Updates the OST user password.
   --delete_client   Deletes the OST client.
   --update_client   Updates attributes of the OST client.
   --limit           Limits bandwidth consumed by ost.

For command-specific help, please type ost --help <command>
For example:
     ost --help show
```

NOTE: The **--files** in the **ost --show --file_history** command represents replicated files that were processed via the DMA optimized duplication operation. This command displays only up to the last 10 such files. The **--name** in the **ost --show --name** command represents the OST container name.

NOTE: For more information about OST-related DR Series system CLI commands, see the *Dell DR Series System Command Line Reference Guide*.

Understanding OST Plug-In Diagnostic Logs

There are currently two supported types of OST plug-ins for which you can collect diagnostic logs: NetBackup and Backup Exec.

NOTE: The directory location, C:\ProgramData, is considered to be a hidden directory on Windows-based systems. However, you can copy and paste C:\ProgramData\Dell\OST\log\ into your Internet Explorer **Address bar** or you can enter this into the Windows command prompt window (**Start**→ **All Programs**→ **Accessories**→ **Command Prompt**).

For more information about OST, OST plug-ins and logs, see Understanding OST, Installing a Dell OST Plug-In, Rotating OST Plug-In Logs for Linux, and Rotating OST Plug-In Logs for Windows.

Rotating OST Plug-In Logs for Windows

By default, the Windows log rotation size is set at 10 megabytes (MB). Once a log file has been reached this size, the OpenStorage Transport (OST) plug-in automatically renames the existing log file, libstspiDell.log to libstspiDell.log.old, and creates a new log.

Modifying Log Rotation Size

To modify the log rotation size, you can edit the following registry key value:

```
HKLM\Software\Dell\OST\LogRotationSize
```

Immediately after modifying this value, the new rotation size value takes effect (meaning that you do not have to restart the backup process).

Collecting Diagnostics Using a Linux Utility

You can use a Linux utility called **Dell_diags** to collect diagnostics from Linux-only clients. This Linux utility is installed by the OST plug-in installer in the /opt/Dell directory. The tool collects the following types of information:

- var/log/libstspiDell.log.*
- usr/openv/netbackup/logs
- usr/openv/logs/nbemm/
- usr/openv/logs/nbrmms/

The **Dell_diags** diagnostics file is written to the following location: /var/log/diags_client location.

The following example shows the process for collecting the OST diagnostic logs (the root user account shown represents one that resides on the media server, and is not to be confused with a root user account on the DR Series system):

```
root@oca3400-74 ~]# ./Dell_diags –collect
Collecting diagnostics...Done
Diagnostics location: /var/log/diags_client//oca3400-74_2012-02-27_23-02-13.tgz
```

The default log level is set to **Error** in the OST plug-in, is user-configurable, and can be modified via the DR Series system CLI or GUI.

Rotating OST Plug-In Logs for Linux

If you set the OST plug-in log level to **Debug**, this can cause the plug-in log to quickly grow in size. The best practice for preventing any issues with log sizes is to rotate the OST plug-in logs using the **logrotate** utility that is commonly available on Linux-based systems.

To configure log rotation, complete the following:

1. Create a file in /etc/logrotate.d/, name it "ost", and add the following entries:

```
/var/log/libstspiDell.log {
    rotate 10
    size 10M
    copytruncate
}
```

2. Create a file in /etc/cron.hourly/, name it "ost_logrotate.cron", and add the following entries:

```
#!/bin/bash
/usr/sbin/logrotate /etc/logrotate.d/ost
```

The **logrotate** utility runs every hour, and rotates the logs whenever the log file size exceeds 10 megabytes (MB). This procedure is automated and is available as part of the OST plug-in installation.

Guidelines for Gathering Media Server Information

In addition to the DR Series system diagnostics log file bundles and core files that you can collect for history and troubleshooting purposes, if you have run any OpenStorage Technology (OST) operations, Dell recommends that you also gather some important media server-related files. This topic introduces some of these key media server files that reside on Linux and Windows platforms .

NetBackup on Linux Media Servers

For NetBackup running on a Linux media server, Dell recommends gathering the following files:

- OST plug-in configuration files and log files from the media server
  - Location: /var/log/libstspiDell.log.*
- NetBackup backup job logs and command logs from the media server:
  - Location: NetBackup log files reside in /usr/openv/netbackup/logs/. For each process in NetBackup, there is a subdirectory in the logs directory. Dell is interested in the following process-related logs: bptm, bpdm, bprd, bpcd, bpbrm.
  - Be aware that these five directories may not exist by default, so only collect these logs if they exist on your media server. If they were created, the locations where these log files reside are as follows: /usr/openv/netbackup/logs/bptm, /usr/openv/netbackup/logs/bpdm, /usr/openv/netbackup/logs/bpcd, /usr/openv/netbackup/logs/bprd, and /usr/openv/netbackup/logs/bpbrm.
  - Dell recommends that you collect logs from the following directories: /usr/openv/logs/nbemm and /usr/openv/logs/nbrmms/.
- Check for any core files that were generated on the NetBackup media server or on the DR Series system that can include:
  - Core files on a Linux NetBackup media server reside in the /usr/openv/netbackup/bin directory. Most of the NetBackup binaries that link with the OST plug-in are in this directory.
  - The location of the core files on the client is not a fixed location. Verify if the core files reside in following directories: /, /root/, or the directory mentioned in the /proc/sys/kernel/core_pattern. For

example, if the following is a core_pattern from a DR Series system (/var/cores/core.%e.%p.%t), then all the core files would reside in /var/cores.

Dell recommends that if core_pattern on the client is set by NAT to a specific directory, then the diagnostics script has to look into that directory for any related cores.

NetBackup on Windows Media Servers

For NetBackup running on a Windows media server, Dell recommends gathering the following files:

- OST plug-in configuration files and log files from the media server:
  - Location: %ALLUSERSPROFILE%\Dell\OST\log\libstspiDell.log*
- NetBackup job logs and command logs from the media server, with log files from following directories:
  - C:\Program Files\Veritas\NetBackup\logs\bptm (if it exists)
  - C:\Program Files\Veritas\NetBackup\logs\bpdm (if it exists)
  - C:\Program Files\Veritas\NetBackup\logs\bpbrm (if it exists)
  - C:\Program Files\Veritas\NetBackup\logs\bprd (if it exists)
  - C:\Program Files\Veritas\NetBackup\logs\bpcd (if it exists)
  - C:\Program Files\Veritas\NetBackup\logs\nbemm
  - C:\Program Files\Veritas\NetBackup\logs\nbrmms
- Any core files generated on the NetBackup media server or on the DR Series system.
- If a server failure is involved (which could be an inapparent or silent failure), the Windows media server event log for the application could be collected by using **Administrative Tools** → **Event Viewer**. Next, check the **Windows Logs** → **Application**. Typically, the last entry marked with **Error** is the one for which you are searching.
  - Copy and paste this text in the window, as shown in the following example:

    ```
    Faulting application bptm.exe, version 7.0.2010.104, time stamp
    0x4b42a78e, faulting module libstspiDellMT.dll, version 1.0.1.0,
    time stamp 0x4f0b5ee5, exception code 0xc0000005, fault offset
    0x000000000002655d, process id 0x12cc, application start time
    0x01cccf1845397a42.
    ```

  - If the system is unresponsive, force the crash of bptm.exe and complete the following:
    1. Click to open **Task Manager**.
    2. Locate the process.
    3. Right-click, and select **Create Dump File**.
    4. Retrieve the dump file from the location specified in the dialog that displays after the dump file is created.

Backup Exec on Windows Media Servers

For Backup Exec running on a Windows media server, Dell recommends gathering the following files:

- OST plug-in configuration files and log files from the media server:
  - Location: %ALLUSERSPROFILE%\Dell\OST\log\libstspiDell.log*
- Backup Exec job logs and command logs from the media server.
- Any core files generated on the Backup Exec media server or on the DR Series system.
- If a crash is involved, collect any mini-dump file(s) that reside in %ProgramFiles%\Symantec\Backup Exec \BEDBG.

- If the system is unresponsive, force the crash of pvlsvr.exe and bengine.exe, and complete the following:
    a. Open Task Manager.
    b. Locate the process.
    c. Right-click, and select **Create Dump File**.
    d. Retrieve the dump file from the location specified in the dialog that displays after the dump file is created.

9

Troubleshooting and Maintenance

This topic provides an overview of the basic troubleshooting and maintenance information that is available to help you better understand the current state of your DR Series system. The following list of information sources can aid you in understanding the current state of and maintaining your system:

- System alert and system event messages:
  for more information, see DR Series System Alert and Event Messages, which provides a tables that list the system alerts and system events.
- Diagnostics service:
  for more information, see About the Diagnostics Service.
- Maintenance mode:
  for more information, see About the DR Series Maintenance Mode.
- Support mode:
  for more information, see About the DR Series Support Mode.
- Scheduling system operations:
  for more information, see Scheduling DR Series System Operations.
- Scheduling Replication operations:
  for more information, see Creating a Replication Schedule.
- Scheduling Cleaner operations:
  for more information, see Creating a Cleaner Schedule.

Troubleshooting Error Conditions

To troubleshoot error conditions that disrupt your normal DR Series system operations, complete the following

1. Generate a DR Series system diagnostics log file bundle if one has not already been automatically created.
   For more information, see Generating a Diagnostics Log File.
2. Check the system alert and system event messages to determine the current status of your DR Series system.
   For more information, see DR Series System Alert and Event Messages, Monitoring System Alerts, and Monitoring System Events.
3. Verify if the DR Series system has recovered or whether it has entered into Maintenance mode or Support mode.
   For more information, see About the DR Series System Maintenance Mode and About the DR Series System Support Mode.
4. If you cannot resolve the issue using the information in this DR Series system documentation, then read Before Contacting Dell Support, and seek assistance from Dell Support.

DR Series System Alert and Event Messages

The DR Series system provides a variety of system alert and system event message types that describe the current state of the system. You can review these messages, and see if there are any actions you can perform to resolve any reported issue.

Dell recommends that you refer to the material in this and other related topics:

- Before any attempt is made to troubleshoot your DR Series system.
- Before contacting Dell Support for technical assistance.

You may be able to resolve any basic issues using the information presented in the DR Series system documentation.

Some alert and event messages are purely informational, and provide general system status. Other alert and event messages display specific status or component information or suggest a specific task you can perform to resolve an issue or to verify that a condition exists.

There are still other alert and event messages that direct you to contact Dell Support for assistance, where Dell Support intervention may be required.

- Table 1 lists the DR Series System Alert Messages by system alert type: general system, system chassis, NVRAM, and PERC-specific alert messages that could be displayed during the course of backup and deduplication-related operations.
- Table 2 lists the DR Series System Event Messages by system event type (type 1 through 7): event messages that could be displayed during the course of backup, replication, deduplication, diagnostics, cleaner, DataCheck, maintenance, and OpenStorage Technology (OST) operations.

Table 6. DR Series System Alert Messages

Alert Message	Description/Meaning or Action
General System Alerts	
Filesystem scan requested.	System is switching to Maintenance mode. Filesystem has read-only access.
NVRAM not detected.	Ensure that the NVRAM card is seated properly.
NVRAM capacitor is disconnected.	Contact Dell Support for possible support assistance or intervention.
NVRAM capacitor has degraded.	Contact Dell Support for possible support assistance or intervention.
NVRAM solid-state drives (SSD) are disconnected.	Contact Dell Support for possible support assistance or intervention.
NVRAM has failed to backup or restore data during the last boot.	Contact Dell Support for possible support assistance or intervention.
NVRAM hardware failure.	Contact Dell Support for possible support assistance or intervention.
Data volume is not present. Check that all drives are installed and powered up.	Contact Dell Support for possible support assistance or intervention.
File server failed to start after multiple attempts.	Contact Dell Support for possible support assistance or intervention.

Alert Message	Description/Meaning or Action
File server failed multiple times. Entering Maintenance mode.	Contact Dell Support for possible support assistance or intervention.
Insufficient disk space exists.	The filesystem is now read-only.
Unable to detect filesystem type on the Data volume.	Contact Dell Support for possible support assistance or intervention.
Unable to detect filesystem type on the Namespace volume.	Contact Dell Support for possible support assistance or intervention.
Filesystem scan discovered inconsistencies.	Please check the filesystem report, and perform the suggested action. Contact Dell Support for possible assistance or intervention.
Replication peer network disconnected.	Check access to remote site.
NVRAM does not match the data volume.	If this is a newly replaced NVRAM, use the **maintenance --hardware --reinit_nvram** command to reinitialize the NVRAM. For more information, see the *Dell DR Series System Command Line Reference Guide*.
Storage usage is approaching the system capacity.	Clean up the filesystem. If issue persists, contact Dell Support for possible assistance or intervention.
Replication resync cannot proceed.	Namespace limit has reached its maximum.
Out of space on replication target.	Clean up the filesystem. If issue persists, contact Dell Support for possible assistance or intervention.
The filesystem has reached the maximum allowable limit for files and directories. Creating new files and directories will be denied.	Clean up the filesystem. If issue persists, contact Dell Support for possible assistance or intervention.
System Chassis Alerts	
Power Supply <*number*> detected a failure.	• Reconnect the power cable to the designated power supply unit if it is disconnected. • Ensure that there is input AC power at the power cable. • Use a different power cord. If this does not resolve the issue, replace the designated power supply.
Power Supply <*number*> is missing or has been removed.	• The power supply might not be making a proper connection. • Try reseating the power supply in the power supply slot. • Reconnect the power cable to the designated power supply unit if it is disconnected. • Ensure that there is input AC at the power cable. • Use a different power cord.

Alert Message	Description/Meaning or Action
	If this does not resolve the issue, replace the designated power supply.
Power Supply <*number*> is unplugged.	• Reconnect the power cable to the designated power supply unit if it is disconnected. • Ensure that there is input AC power at the power cable. • Use a different power cord.
Fan <*number*> failed.	• Verify that the designated cooling fan is present and is installed correctly. • Verify that the designated cooling fan spins up and runs.
	If this does not resolve the issue, replace the designated cooling fan.
Fan <*number*> is missing.	Attach or replace the designated missing cooling fan.
Abnormal network errors detected on Network Interface Controller <*number*>.	The Network Interface Controller errors could be caused by network congestion or by packet errors.
	• Check your network. If that does not resolve the problem, then replace the NIC. • If the NIC is embedded, the DR Series system appliance requires service.
Network Interface Controller is missing.	• Remove and reinsert the NIC. • If this does not resolve the problem, replace the NIC.
Network Interface Controller <*name*> is disconnected.	Connect it to a network and/or check your network switches or routers for any network connectivity issues.
Network Interface Controller <*name*> is disabled.	Enable the port on the designated NIC.
Network Interface Controller <*name*> driver is bad.	Upgrade the DR Series system appliance (in the **Software Upgrade** page, and click **Start Upgrade**).
CPU <*name*> failed.	Replace the designated failed processor.
CPU <*name*> is missing.	Reinsert or replace the designated missing processor.
DIMM <*name*> failed.	Replace the designated failed DIMM (Dual In-line Memory Module) device.
DIMM <*name*> is missing.	• Reinsert or replace the designated DIMM device. • The memory capacity of the storage appliance is below the minimum required for correct operation. • The storage appliance requires service.
Temperature probe <*name*> failed.	The storage appliance requires service.
Voltage probe <*name*> failed.	The storage appliance requires service.

Alert Message	Description/Meaning or Action
Temperature probes have recorded temperatures in the failed range.	• Check the **Events** page in the DR Series system for specific temperature events and the location of the temperature probes. • Check the data center air conditioning, ventilation, and internal system cooling fans for any problems. • Ensure there is proper air flow through the storage appliance, and as needed, clean the cooling vents.
Voltage probes have recorded readings in the failed range.	• Check the **Events** page in the DR Series system for specific voltage events and the location of the voltage probes. • Check the power supplies. If there are no issues with the power supplies, have a service technician check the DR Series system appliance to see if it requires any servicing.
Storage Controller <*number*> failed.	Replace the RAID controller in the DR Series system.
Storage Controller <*number*> is missing.	Reinsert or replace the RAID controller in the DR Series system.
Storage Controller <*number*> has an illegal configuration.	The expected number of virtual drives is <*number*>, and the actual number of virtual drives found was <*number*>. Run the Dell Restore Manager (RM) utility to repair the drive configuration mismatch. The expected number of enclosures is <*number*>, and the actual number of enclosures found was <*number*>. • Check the SAS cable connections between the storage controller and all its enclosures. • Check the power cable connections to the enclosure power supplies.
Physical disk <*number*> failed.	Replace the physical disk that failed.
Physical disk <*number*> is missing, removed, or it cannot be detected.	Reinsert or replace the physical disk.
Physical disk <*number*> predictive failure reported.	Replace the physical disk. **NOTE:** Even though the disk may not have failed yet, the recommended best practice is to replace the disk.
Physical disk <*number*> is an unsupported type.	This disk type is unsupported and cannot be used in this configuration. Replace the unsupported physical disk with a Dell-supported SAS physical disk.
Physical disk <*number*> has been manually set to offline with a configuration command.	Remove the physical disk and reinsert it (the drive is non-operational in this state).
Physical disk <*number*> is foreign.	This can occur when a storage controller has been replaced or all drives have been migrated from another system. In such cases, the foreign configuration should be imported.

Alert Message	Description/Meaning or Action
	If this is seen on a single physical disk, the foreign configuration should be cleared. **NOTE:** This condition can also be seen when a drive is removed and reinserted while a rebuild is still in progress.
Virtual Disk <*number*> failed.	Replace any failed or missing physical disk(s) and run the Dell Restore Manager (RM) utility.
Virtual Disk <*number*> has an invalid layout.	Run the Dell Restore Manager (RM) utility to repair this installation.
<*device*> failed.	• Verify that the device is present, and then check that the cables are properly connected. For more information, see the *Dell DR Series System Owner's Manual* to verify the system cabling is correct. • Check the connection to the controller battery and the status of battery health. • If none of these steps resolve the problem, replace the storage controller battery.
<*device*> is missing.	• Verify that the device is present, and then check that the cables are properly connected. For more information, see the *Dell DR Series System Owner's Manual* to verify the system cabling is correct. • Check the connection to the controller battery and the status of battery health. **NOTE:** A battery with a weak or depleted charge can cause this warning.
Storage <*device*> has failed.	Check cable connections between the storage controller and the enclosure or backplane.
Storage <*device*> is missing.	Perform the following: • Check SAS and power cable connections between the storage controller and the enclosure or backplane. • Check the external enclosure management modules (EMM) and PERC status LEDs.
NVRAM Alerts	
NVRAM PCI Controller failed.	Replace the NVRAM PCI Controller.
NVRAM PCI Controller is missing.	Reinsert or replace the NVRAM PCI Controller.
Super Capacitor on the NVRAM PCI Controller failed.	Replace the NVRAM PCI Controller.
Super Capacitor on the NVRAM PCI Controller is missing.	Replace the NVRAM PCI Controller.
Failed to check software compatibility.	Upgrade the DR Series system appliance (in the **Software Upgrade** page, click **Start Upgrade**).

Alert Message	Description/Meaning or Action
The system software package is incompatible with the current software stack.	Upgrade the DR Series system appliance (in the **Software Upgrade** page, click **Start Upgrade**).
PERC Alerts	
The storage appliance failed to gather the system diagnostics.	• Resolve all issues in the DR Series system diagnostics log bundle. • Re-attempt to collect the diagnostics log bundle. • Contact Dell Support for assistance.
Storage Appliance Critical Error: BIOS System ID is incorrect for correct operation of this storage appliance.	• The DR Series system appliance requires service. • Contact Dell Support for assistance.

Table 7. DR Series System Event Messages

System Event Message	Description/Meaning or Action
System Event = Type 1	
System memory usage has returned to an optimal level.	Informational message. No user intervention is required.
A high level of system process usage has been detected, if it persists, please collect system diagnostics.	Informational message. No user intervention is required.
System process usage has returned to an optimal level.	Informational message. No user intervention is required.
A high-temperature reading has been detected on the NVRAM PCI controller. System will operate only in a read-only mode. Please check system airflow.	Informational message. No user intervention is required.
A high-temperature reading has been detected on the NVRAM PCI controller. System will not become operational until the temperature reduces to an ambient value of 55 degrees Celsius (131 degrees Fahrenheit).	Informational message. No user intervention is required. If issue persists, contact Dell Support for assistance or intervention.
The next NVRAM capacitor health check is scheduled for <*variable*>.	Informational message. No user intervention is required.
Windows Active Directory client is unable to contact the Active Directory domain server.	Informational message. No user intervention is required.
Active Directory domain server connectivity is restored.	Informational message. No user intervention is required.
The system IP address has changed from <*variable*> to <*variable*>.	Informational message. No user intervention is required.
Filesystem scan has been requested. Switching to Maintenance mode. Filesystem has read-only access.	Informational message. No user intervention is required.

System Event Message	Description/Meaning or Action
NVRAM not detected. Ensure card is seated properly.	Verify that the NVRAM card is seated properly in the DR Series system appliance. Contact Dell Support for assistance or intervention.
NVRAM capacitor is disconnected.	Contact Dell Support for assistance or intervention.
NVRAM capacitor has degraded.	Contact Dell Support for assistance or intervention.
NVRAM SSD is disconnected.	Contact Dell Support for assistance or intervention.
NVRAM has failed to backup or restore data during the last boot.	Contact Dell Support for assistance or intervention.
NVRAM hardware failure.	Contact Dell Support for assistance or intervention.
Data volume is not present. Check that all drives are inserted and powered up.	Contact Dell Support for assistance or intervention.
Filesystem server failed to start after multiple attempts.	Contact Dell Support for assistance or intervention.
Filesystem server crashed multiple times. System is now entering Maintenance mode.	Contact Dell Support for assistance or intervention.
Insufficient disk space. Filesystem switched to read-only mode.	Informational message. No user intervention is required. If issue persists, contact Dell Support for assistance or intervention.
Unable to detect filesystem type on the Data Volume.	Contact Dell Support for assistance or intervention.
Unable to detect filesystem type on the Namespace Volume.	Contact Dell Support for assistance or intervention.
Filesystem scan discovered inconsistencies.	Please check report and take the recommended action. Contact Dell Support for assistance or intervention.
NVRAM does not match data volume.	If this is a newly replaced NVRAM device, use the CLI **maintenance --hardware --reinit_nvram** command. For more information, see the *Dell DR Series System Command Line Reference Guide*.
Storage usage is approaching the DR Series system capacity.	Informational message. No user intervention is required. If issue persists, contact Dell Support for assistance or intervention.
Replication resync cannot proceed because the Namespace depth has reached its maximum.	Informational message. No user intervention is required. If issue persists, contact Dell Support for assistance or intervention.
Filesystem has reached the maximum allowable file(s) and directories limit. New file and directory creation will be denied until sufficient space exists.	Please clean up the filesystem. If issue persists, contact Dell Support for assistance or intervention.
Filesystem is reaching the maximum allowable file(s) and directories limit. New file and directory creation will be denied after the limit has been reached.	Please clean up the filesystem. If issue persists, contact Dell Support for assistance or intervention.
Replication has encountered an unexpected error.	Contact Dell Support for assistance or intervention.

System Event Message	Description/Meaning or Action
DataCheck has detected a potential corruption.	Run data consistency checks at the first available opportunity. If this issue persists, contact Dell Support for assistance or intervention.
Temperature warning detected on NVRAM PCI controller.	Please check the data center air conditioning, rack ventilation, and internal cooling fans for any issues. Ensure that there is proper air flow through the system appliance, and clean the system cooling vents as needed. If issue persists, contact Dell Support for assistance or intervention.
Filesystem Name Space partition has reached its maximum allowable limit.	Please delete any old, unused file(s) or disable replication(s). If issue persists, contact Dell Support for assistance or intervention.
Filesystem Name Space partition is reaching its maximum allowable limit.	New replication resynch(s) will be stopped. If issue persists, contact Dell Support for assistance or intervention.
One or more software packages are incompatible.	Please upgrade the system appliance to rectify the issue. Upgrade the DR Series system appliance (in the **Software Upgrade** page, click **Start Upgrade**).
System Event = Type 2	
Container <*name*> created successfully.	Informational message. No user intervention is required.
Container <*name*> marked for deletion.	For more information, see Deleting Containers. Use the DR Series system CLI **maintenance --filesystem --reclaim_space** command to recover this storage space.
Successfully renamed container <*name*> as <*name*>.	Informational message. No user intervention is required.
Successfully added connection entry for container <*name*>: type <*variable*> clients <*variable*>.	Informational message. No user intervention is required.
Successfully updated connection entry for container <*name*>: type <*variable*> clients <*variable*>.	Informational message. No user intervention is required.
Successfully deleted connection entry for container <*name*>: type <*variable*> clients <*variable*>.	Informational message. No user intervention is required.
Replication entry updated successfully for container <*name*>: role <*variable*> peer <*variable*> peer container <*variable*>.	Informational message. No user intervention is required.
Replication configuration updated successfully for container <*name*>: role <*variable*> peer <*variable*>.	Informational message. No user intervention is required.
Replication configuration deleted successfully for container <*name*>: peer <*variable*> peer container <*name*>.	Informational message. No user intervention is required.
Replication <*variable*> defaults successfully updated: role <*variable*> peer <*variable*>.	Informational message. No user intervention is required.
Successfully updated replication bandwidth limit for <*variable*> to <*variable*>.	Informational message. No user intervention is required.

System Event Message	Description/Meaning or Action
Successfully removed replication bandwidth limit for <*variable*>.	Informational message. No user intervention is required.
Successfully set <*variable*> replication bandwidth limit.	Informational message. No user intervention is required.
Successfully initiated replication resync on container <*name*>.	Informational message. No user intervention is required.
Failure initiating replication resync on container <*name*>.	For more information, see Managing Replication Operations.
Snapshot <*variable*> → <*variable*> created successfully.	Informational message. No user intervention is required.
Snapshot <*variable*> → <*variable*> successfully updated.	Informational message. No user intervention is required.
Snapshot <*variable*> → <*variable*> successfully deleted.	Informational message. No user intervention is required.
Online data verification <*variable*> successfully.	Informational message. No user intervention is required.
Successfully <*variable*> system marker for <*variable*>.	Informational message. No user intervention is required.
Successfully updated <*variable*> schedule.	Informational message. No user intervention is required.
System Event = Type 3	
System is entering Maintenance mode.	Informational message. No user intervention is required. Contact Dell Support for assistance or intervention.
System is entering Support mode.	Informational message. No user intervention is required. Contact Dell Support for assistance or intervention.
Failure—OFS client initialization failure.	Contact Dell Support for assistance or intervention.
Failure—mtab initialization failure for container if <*variable*>.	Contact Dell Support for assistance or intervention.
Failure—cannot initialize node mtab.	Contact Dell Support for assistance or intervention.
Failure retrieving configuration for container ID <*variable*>.	Contact Dell Support for assistance or intervention.
Failure deleting container ID <*variable*>.	Contact Dell Support for assistance or intervention.
Failure stopping container ID <*variable*>.	Contact Dell Support for assistance or intervention.
Failure adding connection <*variable*> for container ID <*variable*>.	Contact Dell Support for assistance or intervention.
Failure deleting connection <*variable*> for container ID <*variable*>.	Contact Dell Support for assistance or intervention.
Replication started as per schedule, will be active until <*variable*>.	Informational message. No user intervention is required.
Replication stopped as per schedule, will restart at <*variable*>.	Informational message. No user intervention is required.

System Event Message	Description/Meaning or Action
Container replay failed for container <*variable*>.	Informational message. No user intervention is required. Contact Dell Support for assistance or intervention.
Failure—Name Space subsystem initialization failed.	Informational message. No user intervention is required. Contact Dell Support for assistance or intervention.
Inconsistencies were found in the Name Space.	Please schedule a filesystem consistency check using the DR Series system CLI **maintenance --filesystem --start_scan** command.
System entering Maintenance mode—Name Space log replay failed.	Contact Dell Support for assistance or intervention.
System entering Maintenance Mode—Name Space transaction failure.	Contact Dell Support for assistance or intervention.
Failure—failed to commit Name Space transaction.	Contact Dell Support for assistance or intervention.
Filesystem has reached the maximum supported number of Name Space entries.	Please clean up the filesystem to allow new file and directory create operations. If this condition persists, contact Dell Support for assistance or intervention.
Filesystem has recovered from a lack of available Name Space entries.	Filesystem create operations will now be allowed. Contact Dell Support for assistance or intervention.
Internal attributes of some files were found to be corrupt. The DR Series system will not allow the setting or removing of Attributes or ACLs on files that have corrupt attributes.	To find all files with corrupt attributes and to clear the state, please perform a maintenance scan using the DR Series system CLI **maintenance --filesystem --start_scan** command. Contact Dell Support for assistance or intervention.
Replication resync started for container <*variable*>.	Informational message. No user intervention is required.
Replication internal resync started for container <*variable*>.	Informational message. No user intervention is required.
Replication resync completed for container <*variable*>.	Informational message. No user intervention is required.
Replication internal resync completed for container <*variable*>.	Informational message. No user intervention is required.
Failure creating replication snapshot for container <*variable*>.	If condition persists, reduce number of inodes, or contact Dell Support for assistance or intervention.
Failure deleting replication snapshot for container <*variable*>.	If condition persists, reduce number of inodes, or contact Dell Support for assistance or intervention.
Replication client connected for container <*variable*>.	Informational message. No user intervention is required.
Replication client disconnected for container <*variable*>.	Verify that the ports for replication (9904, 9911, 9915, and 9916) and OST (10011 and 11000) operations have been enabled. If issue persists, contact Dell Support for assistance or intervention.
Replication server connected for container <*variable*>.	Verify that the ports for replication (9904, 9911, 9915, and 9916) and OST (10011 and 11000) operations have been enabled. If issue persists, contact Dell Support for assistance or intervention.

System Event Message	Description/Meaning or Action
Replication server disconnected for container <*variable*>.	Informational message. No user intervention is required.
Replication Name Service volume operations log (oplog) full for container <*variable*>.	Verify that the ports for replication (9904, 9911, 9915, and 9916) and OST (10011 and 11000) operations have been enabled. If issue persists, contact Dell Support for assistance or intervention.
DR Series entering Maintenance mode due to corrupt Name Service volume operations log (oplog) for container <*variable*>.	The DR Series system should self-correct itself. If condition persists, reduce number of inodes, or contact Dell Support for assistance or intervention.
Replication data operations log (oplog) full for container <*variable*>.	The DR Series system should self-correct itself. If condition persists, reduce number of inodes, or contact Dell Support for assistance or intervention.
DR Series entering Maintenance mode due to corrupt replication data operations log (oplog) for container <*variable*>.	The DR Series system should self-correct itself. If condition persists, reduce number of inodes, or contact Dell Support for assistance or intervention.
System entering Maintenance mode due to corrupt blockmap for container <*variable*> scid <*variable*>.	The DR Series system should self-correct itself. If condition persists, reduce number of inodes, or contact Dell Support for assistance or intervention.
System entering Maintenance Mode due to corrupt datastore <*variable*> scid <*variable*>.	The DR Series system should self-correct itself. If condition persists, reduce number of inodes, or contact Dell Support for assistance or intervention.
Replication transmit log (txlog) full for container <*variable*>.	The DR Series system should self-correct itself. If condition persists, reduce number of inodes, or contact Dell Support for assistance or intervention.
DR Series entering Maintenance mode due to corrupt replication txlog for container <*variable*>.	Collect a diagnostics log file, and open a Support record with Dell Support for assistance.
System entering Maintenance mode due to replication txlog commit error <*variable*> for container <*variable*>.	Collect a diagnostics log file, and open a Support record with Dell Support for assistance.
DR Series entering Maintenance mode due to corrupt chunk data for container <*variable*>.	Collect a diagnostics log file, and open a Support record with Dell Support for assistance.
File replication unable to make progress on container <*variable*>.	Collect a diagnostics log file, and open a Support record with Dell Support for assistance.
Replication syncmgr exited for container <*variable*> error <*variable*>.	Collect a diagnostics log file bundle, and open a Support record with Dell Support for assistance.
Replication syncmgr event for container <*variable*> error <*variable*>.	Collect a diagnostics log file bundle, and open a Support record with Dell Support for assistance.
Replication Name Service exited for container <*variable*> error <*variable*>.	Collect a diagnostics log file bundle, and open a Support record with Dell Support for assistance.
Replication data replicator exited for container <*variable*> error <*variable*>.	Collect a diagnostics log file bundle, and open a Support record with Dell Support for assistance.

System Event Message	Description/Meaning or Action
Replication protocol version mismatch for container <*variable*> error <*variable*>.	Collect a diagnostics log file bundle, and open a Support record with Dell Support for assistance.
Replication delete cleanup failed for container <*variable*> error <*variable*>.	Collect a diagnostics log file bundle, and open a Support record with Dell Support for assistance.
Replication target system <*variable*> is running low on space. Replication cannot proceed further on container <*variable*>.	Informational message. Contact Dell Support for assistance or intervention.
Replication misconfiguration detected for container <*variable*>. Replication relationship might have been deleted forcibly on target system <*variable*>.	Informational message. Contact Dell Support for assistance or intervention.
Replication failed for container <*variable*> error <*variable*>.	Collect a diagnostics log file bundle, and open a Support record with Dell Support for assistance.
Replication server failed to commit blockmap for container <*variable*>. System is entering Maintenance mode.	The DR Series system should self-correct itself. If condition persists, reduce number of inodes, or contact Dell Support for assistance or intervention.
Replication container <*variable*> is paused due to files pending in the Cleaner process.	Run the Cleaner on the replica container. If condition persists, contact Dell Support for intervention or assistance.
System is running a lower version of RPC. This will stall replication on all target containers.	Please upgrade RPC to correct version. If condition persists, contact Dell Support for intervention or assistance.
NFS client successfully mounted <*variable*>.	Informational message. No user intervention is required.
Maximum NFS connection limit <*variable*> reached, active NFS connections <*variable*>.	You have reached the threshold limit. Reduce the number of connections.
NFS server started successfully.	Informational message. No user intervention is required.
CIFS client successfully connected to container <*variable*>.	Informational message. No user intervention is required.
Maximum CIFS connection limit <*variable*> reached.	You have reached the threshold limit. Reduce the number of connections.
CIFS server failed to start <*variable*>.	Reboot the DR Series system. If issue persists, contact Dell Support for assistance or intervention.
CIFS client connected <*variable*> times to container <*variable*>.	Reboot the DR Series system. If issue persists, contact Dell Support for assistance or intervention.
CIFS server started successfully.	Informational message. No user intervention is required.
Online data verification (DataCheck) started.	Informational message. If issue persists, contact Dell Support for assistance or intervention.
Online data verification (DataCheck) suspended.	Informational message. If issue persists, contact Dell Support for assistance or intervention.
Online data verification (DataCheck) stopped.	Informational message. If issue persists, contact Dell Support for assistance or intervention.

System Event Message	Description/Meaning or Action
Online data verification (DataCheck) resumed.	Informational message. If issue persists, contact Dell Support for assistance or intervention.
Online data verification (DataCheck) detected <*variable*> corruption.	Informational message. If issue persists, contact Dell Support for assistance or intervention.
Online data verification (DataCheck) detected <*variable*> corruptions.	Informational message. If issue persists, contact Dell Support for assistance or intervention.
Online data verification (DataCheck) failed to start.	Informational message. If issue persists, contact Dell Support for assistance or intervention.
System Event = Type 4	
Unable to load deduplication dictionary <*variable*>.	Use the DR Series system CLI **maintenance --configuration --reinit_dictionary** command. If this issue persists, contact Dell Support for assistance or intervention.
Unable to locate deduplication dictionary <*variable*>.	Use the DR Series system CLI **maintenance --configuration --reinit_dictionary** command. If issue persists, contact Dell Support for assistance or intervention.
Cleaner process run <*variable*> started.	Informational message. No user intervention is required.
Cleaner process run <*variable*> completed in <*variable*> milliseconds (ms).	Informational message. No user intervention is required.
Cleaner process encountered input/output (I/O) errors.	Maintenance-based issue with the DR Series system. Check status using Maintenance mode or DR Series system CLI commands. Contact Dell Support as needed.
Failure to sync NVRAM <*variable*>.	NVRAM hardware issue with the DR Series system. Check status using Maintenance mode or DR Series system CLI commands.
Failure in reading from NVRAM <*variable*>.	NVRAM hardware issue with the DR Series system. Check status using Maintenance mode or DR Series system CLI commands.
Failure in writing to NVRAM <*variable*>.	NVRAM hardware issue with the DR Series system. Check status using Maintenance mode or DR Series system CLI commands.
Failure to write sync NVRAM <*variable*>.	NVRAM hardware issue with the DR Series system. Check status using Maintenance mode or DR Series system CLI commands.
Datastore <*variable*> length mismatch <*variable*>.	Maintenance-based issue with the DR Series system. Check status using Maintenance mode or DR Series system CLI commands. Contact Dell Support as needed.
Data volume capacity threshold reached.	Informational message. No user intervention is required.
Out of space. Rollback of updates on object <*variable*> failed. Restarting file server.	Maintenance-based issue with the DR Series system. Check status using Maintenance mode or DR Series system CLI commands. Contact Dell Support as needed.

System Event Message	Description/Meaning or Action
Failure reading from data volume.	Maintenance-based issue with the DR Series system. Check status using Maintenance mode or DR Series system CLI commands. Contact Dell Support as needed.
Failure writing to data volume.	Maintenance-based issue with the DR Series system. Check status using Maintenance mode or DR Series system CLI commands. Contact Dell Support as needed.
Checksum verification on metadata failed.	Contact Dell Support for assistance or repair the filesystem. For repairs, see About The DR Series Maintenance Mode.
Optimization engine log replay failed.	Contact Dell Support for assistance or repair the filesystem. For repairs, see About The DR Series Maintenance Mode.
Decompression of datastore failed <*variable*>.	Contact Dell Support for assistance or intervention.
Failed to clean active datastore <*variable*>.	Contact Dell Support for assistance or intervention.
Negative reference on datastore <*variable*>. Record type: <*variable*>. Count: <*variable*>.	Contact Dell Support for assistance or repair the filesystem. For repairs, see About the DR Series Maintenance Mode.
Datastore <*variable*> contains negative stream reference count. Record type: <*variable*>. Count: <*variable*>.	Informational message. No user intervention is required.
Datastore <*variable*> total reference count reached threshold. Record type: <*variable*>. Count: <*variable*>.	Informational message. No user intervention is required.
Entering Maintenance mode due to failure in processing logs.	Contact Dell Support for assistance or intervention.
Failed to acquire optimizer pipeline. Error: <*variable*>.	Contact Dell Support for intervention or assistance.
Failed to create optimizer event. Type: <*variable*>, Error: <*variable*>.	Contact Dell Support for intervention or assistance.
Task execution in fiber <*variable*> timed out after <*variable*> milliseconds (ms). Restarting file server.	Filesystem restarted. Collect diagnostics log file bundle, and upload diagnostics log file bundle to Dell Support.
Memory allocation failure.	Collect diagnostics log file bundle.
Background compression started.	Informational message. No user intervention is required.
Background compression completed.	Informational message. No user intervention is required.
Optimization initialized on container <*variable*>.	Informational message. No user intervention is required.
Optimization terminated on container <*variable*>.	Informational message. No user intervention is required.
Cleaner process started as per schedule, will be active until <*variable*>.	Informational message. No user intervention is required.
Cleaner process stopped as per schedule, will restart at <*variable*>.	Informational message. No user intervention is required.
Cleaner aborted at <*variable*>.	The DR Series system should enter Maintenance mode, and Cleaner process will restart.

System Event Message	Description/Meaning or Action
Moving data from NVRAM to disk failed. System is entering its Maintenance mode.	Informational message. No user intervention is required.
Last event/invalid event.	Informational message. Contact Dell Support for assistance or intervention.
Filesystem Cleaner process started as per schedule (will be active until <*variable*>).	Informational message. No user intervention is required.
Filesystem Cleaner process stopped as per schedule (will restart at <*variable*>).	Informational message. No user intervention is required.
System Event = Type 5	
System shutdown initiated by administrator.	Informational message. No user intervention is required.
System reboot initiated by administrator.	Informational message. No user intervention is required.
Start system upgrade to version <*variable*>.	Informational message. No user intervention is required.
System name changed to <*variable*>.	Informational message. No user intervention is required.
System date changed to <*variable*>.	Informational message. No user intervention is required.
System time zone changed to <*variable*>.	Informational message. No user intervention is required.
Password changed for user: administrator.	Informational message. No user intervention is required.
NTP server <*variable*> added.	Informational message. No user intervention is required.
NTP server <*variable*> deleted.	Informational message. No user intervention is required.
NTP service enabled.	Informational message. No user intervention is required.
NTP service disabled.	Informational message. No user intervention is required.
User data destroyed using CLI command.	Informational message. No user intervention is required.
User <*variable*> enabled.	Informational message. No user intervention is required.
User <*variable*> disabled.	Informational message. No user intervention is required.
Networking interfaces restarted.	Informational message. No user intervention is required.
DHCP enabled: IP address assigned by DHCP.	Informational message. No user intervention is required.
Static IP address <*variable*> assigned.	Informational message. No user intervention is required.
Network interface bonding mode set to <*variable*>.	Informational message. No user intervention is required.
Network MTU size set to <*variable*>.	Informational message. No user intervention is required.
System name set to <*variable*>.	Informational message. No user intervention is required.
Email relay host set to <*variable*> for email alerts.	Informational message. No user intervention is required.
Recipients for email alerts set to <*variable*>.	Informational message. No user intervention is required.
Recipient <*variable*> added to receive email alerts.	Informational message. No user intervention is required.
Recipient <*variable*> is no longer receiving email alerts.	Check whether email recipient still exists, or if mailbox is full.

System Event Message	Description/Meaning or Action
Administrator information set to <*variable*> for email alerts.	Informational message. No user intervention is required.
Test email sent.	Informational message. No user intervention is required.
Joined the Windows Active Directory domain <*variable*>.	Informational message. No user intervention is required.
Left the Windows Active Directory domain <*variable*>.	Informational message. No user intervention is required.
System diagnostics package <*variable*> deleted.	Informational message. No user intervention is required.
All diagnostic packages deleted.	Informational message. No user intervention is required.
System diagnostic package <*variable*> is copied off the system.	Informational message. No user intervention is required.
System statistics reset by administrator.	Informational message. No user intervention is required.
System diagnostic package <*variable*> is collected.	Informational message. No user intervention is required.
System diagnostics space usage exceeded threshold. Auto cleaning oldest package: <*variable*>.	Informational message. No user intervention is required.
CIFS server cannot access file service.	Contact Dell Support for intervention or assistance. Collect diagnostics log file bundle, and upload to Dell Support.
Host <*variable*> added to SNMP alert recipient list.	Informational message. No user intervention is required.
Host <*variable*> deleted from SNMP alert recipient list.	Informational message. No user intervention is required.
Host <*variable*> enabled for SNMP alerts.	Informational message. No user intervention is required.
Host <*variable*> disabled for SNMP alerts.	Informational message. No user intervention is required.
User <*variable*> logged into the system.	Informational message. No user intervention is required.
CIFS user <*variable*> added.	Informational message. No user intervention is required.
CIFS user <*variable*> deleted.	Informational message. No user intervention is required.
Password changed for CIFS user <*variable*>.	Informational message. No user intervention is required.
System upgrade completed <*variable*>.	Informational message. No user intervention is required.
Cleared foreign configuration on disk <*variable*>.	Informational message. No user intervention is required.
User <*variable*> logged into the system.	Informational message. No user intervention is required.
Disk <*variable*> configured as hot spare.	Informational message. No user intervention is required.
Cleared foreign configuration on disk <*variable*>.	Informational message. No user intervention is required.
Telnet service enabled.	Informational message. No user intervention is required.
Telnet service disabled.	Informational message. No user intervention is required.
DNS settings updated with primary <*variable*>, secondary <*variable*>, and suffix <*variable*>.	Informational message. No user intervention is required.
System initialized successfully.	Informational message. No user intervention is required.
Security privilege(s) changed for <*variable*>.	Informational message. No user intervention is required.

System Event Message	Description/Meaning or Action
Miscellaneous Invalid/Last Event.	Informational message. No user intervention is required.
System Event = Type 6	
File system check restarted.	Informational message. No user intervention is required.
File system check completed successfully. No inconsistencies were found.	Informational message. No user intervention is required.
File system check found some inconsistencies.	The DR Series system Maintenance mode repair process should resolve this. If the problem persists, contact Dell Support for assistance or intervention.
File system repair started.	Informational message. No user intervention is required.
File system repair completed.	Informational message. No user intervention is required.
File system check stop requested.	Informational message. No user intervention is required.
One (or more) file(s) were deleted as part of the repair process.	Informational message. No user intervention is required. To verify, please use the DR Series system CLI **maintenance --filesystem --repair_history verbose** command.
One or more file(s) were deleted as part of the repair process for container <*variable*>. Replication will be stopped for this container.	Informational message. No user intervention is required.
One or more file(s) were deleted as part of the repair process for container <*variable*>. Resync has been initiated for this container.	Informational message. No user intervention is required.
System Event = Type 7	
OST server started successfully.	Informational message. No user intervention is required.
OST server failed to start.	Restart the OST server. If issue persists, contact Dell Support for assistance or intervention.
OST server stopped successfully.	Informational message. No user intervention is required.
OST client authentication failed.	Retry the OST client authentication. If issue persists, contact Dell Support for assistance or intervention.
OST Logical Storage Unit (LSU) quota exceeded <*variable*>.	Informational message. Reduce the number of LSUs. If issue persists, contact Dell Support for assistance or intervention.
OST backup failed <*variable*>.	Retry the OST backup operation. If issue persists, contact Dell Support for assistance or intervention.
OST Opdup failed <*variable*>.	The OST optimized duplication process failed. If issue persists, contact Dell Support for assistance or intervention.
OST Restore failed <*variable*>.	The OST restore process failed. If issue persists, contact Dell Support for assistance or intervention.
OST connections exceeded the maximum limit; count: <*variable*>, maximum limit: <*variable*>.	Informational message. Reduce the number of OST connections. If issue persists, contact Dell Support for assistance or intervention.

System Event Message	Description/Meaning or Action
Connection from the OST client <*variable*> aborted.	Informational message. No user intervention is required.
OST client protocol version is not supported.	Informational message. No user intervention is required. Check for the supported OST client versions in the *Dell DR Series System Interoperability Guide*.
System is entering the Maintenance mode: OST LSU information file is corrupted.	Informational message. No user intervention is required. If issue persists, contact Dell Support for assistance or intervention.
System is entering the Maintenance mode: OST LSU image information is corrupted.	Informational message. No user intervention is required. If issue persists, contact Dell Support for assistance or intervention
OST client connection was reset.	Informational message. No user intervention is required.
System is entering the Maintenance mode: OST meta directory is corrupted.	Informational message. No user intervention is required.
OST server initialization failed.	Informational message. No user intervention is required.
OST server initialization was successful.	Informational message. No user intervention is required.

About the Diagnostics Service

The **Diagnostics** service in the DR Series system lets you display, collect, and manage your system's diagnostic log file bundles. Each diagnostic log file bundle provides:

- A current snapshot of system operations
- System-related information that assists in understanding system operations
- A record of system operations in case Dell Support needs to provide technical assistance

To access this functionality, use the following DR Series system navigation panel GUI option:

- **Support → Diagnostics**

The **Diagnostics** service works by collecting all the system-related information that could help when diagnosing a problem or error condition in the system.

For more information about diagnostics log file bundles, see Diagnostics Page and Options.

Diagnostics runs as a service during system startup, and this process listens for incoming requests. There are two modes in which the diagnostics collection process is started:

- **Admin-Generated mode**: when a DR Series system CLI or DR Series system GUI request is made by the administrator (and the default reason that is listed is admin-generated).
- **Auto-Generated mode**: when a process or service failure is reported, the DR Series system starts collecting system-related information. After it completes the auto-generated collection, it generates a system event.

When the diagnostics log directory exceeds the maximum storage capacity, any log older than one hour is automatically deleted. The DR Series system GUI lets you download and save diagnostics log files to other systems on your network. The DR Series system also maintains a separate archive logs directory that collects other system-related information, and these archive logs are also automatically deleted when they exceed a maximum capacity.

For more information, see Diagnostics Page and Options, Generating a Diagnostics Log File, Downloading Diagnostics Log Files. and Deleting a Diagnostics Log File.

NOTE: When you generate a diagnostics log file bundle, it contains all of the DR Series system information that you need when contacting Dell Support for technical assistance. When a diagnostics log file bundle is generated, this process also collects all the previous auto-generated diagnostics and deletes them from the system.

The diagnostics log file bundle collects the same type of hardware, storage, and operating system information that is collected when using the Dell System E-Support Tool (DSET) and the DR Series system CLI commands (**diagnostics --collect --dset**). For more information about DR Series system command line interface commands, see the *Dell DR Series Command Line Reference Guide*.

The DSET-based information that gets collected for the system helps Dell Support to troubleshoot or evaluate the status of your DR Series system.

Understanding Diagnostics Collection

The Diagnostics service collection tool process observes the following guidelines:

- DR Series system triggers an automatic diagnostic log collection of the DR Series system status for any system process or service failures.
- All automatic diagnostic collection requests are queued and executed sequentially.
- The DR Series system GUI provides options to display existing diagnostics logs, generate new diagnostics logs, download and save copies of existing diagnostics logs, or delete existing diagnostics logs. For more information, see Diagnostics Page and Options and About the Diagnostics Service.
- The DR Series system CLI also provides the means for managing, generating, or downloading the diagnostics log files. For more information, see the *Dell DR Series System Command Line Reference Guide*.

About the DR Series System Maintenance Mode

In general, the DR Series system enters the **Maintenance** mode whenever the filesystem has encountered an issue that prevents it from operating normally.

When in its **Maintenance** mode, the filesystem is in a read-only state, and the system runs the following maintenance-based operations:

NOTE: Whenever the DR Series systems enters or exits from the **Maintenance** mode state, all communication via CIFS, NFS, or OST is lost.

- Runs an internal filesystem check.
- Generates a filesystem status report (if the filesystem check finds no issues, the DR Series system switches back to **Operational** mode without user intervention).

If the filesystem check finds issues, you can choose to make repairs (using **Confirm Repair Filesystem**) or ignore the detected issue (using **Skip Repair Filesystem**), at which point the system switches back to **Operational** mode.

The **Maintenance** mode process displays a number of stages, indicated on the Maintenance Mode progress bar, which include:

- Preparing for Filesystem Check
- Scan in Progress
- Completed Generating Report

  NOTE: If the Filesystem Check detects any repairable files, it generates a Repair Report that identifies these reported files. The Maintenance Mode progress bar halts at the Completed Generating Repair stage, and remains in **Maintenance** mode until you click **Confirm Repair Filesystem**. The DR Series system does not advance to the Switching to Operation Mode stage until the filesystem repair is completed.
- Switching to Operational Mode

- Operational Mode (Normal State)

The **Maintenance Mode** page provides the following information:

- Maintenance Mode Progress bar:
  - Displays the five stages of **Maintenance** mode
  - Updates the progress bar as each stage completes

    NOTE: If an alert displays above the Maintenance Mode progress bar, this indicates that the filesystem check has completed, and it has generated a report on the repairable files (which are displayed in the Repair Report pane under the Maintenance Mode progress bar). To repair all of the reported files listed in the Repair Report, you must click **Confirm Repair Filesystem**.
- Repair Report:
  - Displays a list of repairable filesystem files that were detected in the Filesystem Check.
  - Identifies the repairable files by Container ID, File/Inode/Directory location, and a brief reason for failure.
  - Provides a search capability that allows you to click **prev** or **next** to display the previous or next page in the Repair Report, or lets you display a specific page number of the Repair Report by entering this number in the **Goto** page and click **go**.
- System Information pane:
  - **System Name**
  - **Software Version**
  - **Current Date/Time**
  - **iDRAC IP Address**
- Support Information
  - **Service Tag**
  - **Last Diagnostic Run**
  - **BIOS Version**

NOTE: When in Maintenance mode, the DR Series system navigation panel displays the following options that are links to display the correspond page in the DR Series system GUI:

- **Alerts**
- **Events**
- **Health**
- **Usage**
- **Diagnostics**
- **Software Upgrade**

Once the DR Series system enters **Maintenance** mode, there can only be two possible outcome states:

- **Operational** mode (Normal State): where the filesystem check was successful, and no system files need to be repaired (Filesystem Check: successful).
- **Maintenance** mode has halted: where the filesystem check detected one or more repairable files (Filesystem Check: unsuccessful).

Filesystem Check — Successful: when the **Maintenance** mode successfully completes all of its stages, the DR Series system displays its status as having entered **Operational** mode (Normal State). Only after the **Maintenance** mode has successfully completed its internal check can it return to an **Operational** mode.

To return to the **Operational** mode, click **Go to Dashboard** on the **Maintenance Mode** page options bar. **Go to Dashboard** is only active when all of the internal system checks have completed and the progress bar indicates that all stages have been completed.

NOTE: You may encounter issues when using data management agents (DMAs) such as NetBackup with expired backup images when the DR Series system is in its **Maintenance** mode.

NOTE: When in **Maintenance** mode, image expiration fails because the DR Series system is in a read-only state. If this occurs, the DMA assumes that the backup images have expired. However, the DR Series system administrator may be unaware that the backup data images still reside on the DR Series system.

Filesystem Check — Unsuccessful: when the **Maintenance** mode halts at the Completed Generating Report stage, this indicates that the filesystem check detected some repairable files, and listed them in the Repair Report pane on the **Maintenance Mode** page.

To return to the **Operational** mode, click **Confirm Repair Filesystem** on the **Maintenance Mode** page options bar to repair the files listed in the Repair Report. **Confirm Repair Filesystem** is the only active option you can select when the progress bar indicates that some filesystem files are in need of repair.

About the DR Series System Support Mode

Generally, the DR Series system enters its **Support** mode only because of one of the following reasons:

- The filesystem has encountered an issue that could not be resolved by running the internal **Maintenance** mode.
- Some system processes failed to start properly.
- The system detected an unsupported configuration.

The **Support** mode puts the DR Series system into a state in which only the following tasks can be performed:

- Generating a DR Series system diagnostics file. For more information, see Generating a Diagnostics Log File.
- Upgrading the DR Series system software. For more information, see Upgrading the DR Series System Software.
- Installing a license for the data storage expansion shelf enclosure. For more information, see Expansion Shelf Licenses and Installing an Expansion Shelf.
- Contacting Dell Support for technical assistance. For more information, see Contacting Dell.

NOTE: Dell recommends that you generate a DR Series system diagnostics file whenever the DR Series system is in its **Maintenance** or **Support** modes if one was not automatically generated.

When in the **Support** mode, the DR Series system displays the following alert message:

```
The server is currently in Support mode. To continue, you must contact Dell
Support at http://www.support.dell.com or contact your Dell support
representative.
```

The

Scheduling DR Series System Operations

The most important thing to remember when scheduling critical DR Series system operations is that you want to ensure that you perform each of these operations at a time when it will not overlap or interfere with the running of any of the other key system operations.

By better scheduling when you run system operations, you can optimize your system resources and make it possible to achieve the best possible DR Series system performance. To do this, plan and schedule time periods in which to perform the following critical system operations:

- Data ingests (which are dependent upon the DMAs)

- Replication process
- Cleaner process (space reclamation)

The main goal in planning and scheduling operations is running the Cleaner and Replication operations at times when they do not overlap or interfere with other important system operations. You want to make sure that by properly scheduling and planning, your system can perform each of these key operations independent of the other.

The best practice is to run these two operations during non-standard business hours, so that they do not conflict with any of your other backup or ingest operations. In short, efficient scheduling maximizes the best use of your system resources.

Dell recommends scheduling resource-intensive operations during specific time periods when no other system operations are being performed. This approach is called *windowing*, which requires scheduling a specific block of time (or "window"), each with a set starting and stopping point so that you can perform data ingests, replication, or space reclamation operations without interfering with the running of any other operation.

Creating a Cleaner Schedule

Performing scheduled disk space reclamation operations are recommended as a method for recovering disk space from system containers in which files were deleted as a result of deduplication. The best method is to schedule a time when you can run the Cleaner on your DR Series system with no other planned processes running. Alternately, another method lets the Cleaner process on the DR Series system run whenever it determines that there are no active data ingests.

NOTE: Even if no Cleaner schedule is set, but the system detects that there is disk space that can be reclaimed, the Cleaner process runs. However, the Cleaner will not start until the following conditions are met: it detects that there are no active data ingests, that two minutes of system idle time have elapsed since the last data file ingest was completed, and that the Replication process is not running (the Cleaner process runs as a lower system priority operation than the Replication process).

NOTE: The **Cleaner Schedule** page displays the current DR Series system time zone and current timestamp (using this format: US/Pacific, Fri Nov 2 15:15:10 2012).

To schedule Cleaner operations on your system, complete the following:

1. Select **Schedules** → **Cleaner Schedule**.
   The **Cleaner Schedule** page is displayed.
2. Click **Schedule** to create a new schedule (or click **Edit Schedule** to modify an existing schedule).
   The **Set Cleaner Schedule** page is displayed.
3. Select (or modify) the **Start Time** and **Stop Time** setpoint values using the **Hour** and **Minutes** pull-down lists to create a Cleaner schedule.

   NOTE: You must set a corresponding **Stop Time** for every **Start Time** set in each Cleaner schedule you create. The DR Series system will not support any Cleaner schedule that does not contain a **Start Time/Stop Time** pair of setpoints (daily or weekly).
4. Click **Set Schedule** for the system to accept your Cleaner schedule (or click **Cancel** to display the **Cleaner Schedule** page).

   NOTE: To reset all of the values in the current Cleaner schedule, click **Reset** in the **Set Cleaner Schedule** dialog. To selectively modify values in the current schedule, make your changes to the corresponding hours and minutes pull-down lists to represent the **Start Time** and **Stop Time** you wish to set, and click **Set Schedule**.

The current Cleaner Status is represented in the **Dashboard** page in the System Information pane as one of the three following states:

- **Pending**—displayed when there is any scheduled window set and the current time is outside the scheduled window for the Cleaner operation.
- **Running**—displayed when the Cleaner operation is running during a scheduled window.
- **Idle**—displayed only if there is no Cleaner operation running during a scheduled window.

Dell recommends that you do not schedule the running of any Cleaner operations during the same time period when replication or ingest operations will be running. Failure to follow this practice will affect the time required to complete the system operations and/or impact your DR Series system performance.

Displaying Cleaner Statistics

To display additional Cleaner statistics, you can use the DR Series system CLI **stats --cleaner** command to show the following categories of Cleaner statistics:

- Last Run Files Processed (number of files processed by Cleaner)
- Last Run Bytes Processed (number of bytes processed by Cleaner)
- Last Run Bytes Reclaimed (number of bytes reclaimed by the Cleaner)
- Last Run Start Time (indicates date and time last Cleaner process started)
- Last Run End Time (indicates date and time last Cleaner process ended)
- Last Run Time To Completion(s) (indicates the number of times that Cleaner process has successfully completed)
- Current Run Start Time (indicates date and time current Cleaner process started)
- Current Run Files Processed (number of files processed by current Cleaner process)
- Current Run Bytes Processed (number of bytes processed by current Cleaner process)
- Current Run Bytes Reclaimed (number of bytes reclaimed by the current Cleaner processed)
- Current Run Phase 1 Start Time (indicates date and time for start of current Cleaner process phase 1)
- Current Run Phase 1 Records Processed (lists the number of data records processed in current Cleaner process phase 1)
- Current Run Phase 1 End Time (indicates date and time for end of current Cleaner process phase 1)
- Current Run Phase 2 Start Time (indicates date and time for start of current Cleaner process phase 2)
- Current Run Phase 2 Records Processed (lists the number of data records processed in current Cleaner process phase 2)
- Current Run Phase 2 End Time (indicates date and time for end of current Cleaner process phase 2)
- Current Run Phase 3 Start Time (indicates date and time for start of current Cleaner process phase 3)
- Current Run Phase 3 Records Processed (lists the number of data records processed in current Cleaner process phase 3)
- Current Run Phase 3 End Time (indicates date and time for end of current Cleaner process phase 3)
- Current Run Phase 4 Start Time (indicates date and time for start of current Cleaner process phase 4)
- Current Run Phase 4 Records Processed (lists the number of data records processed in current Cleaner process phase 4)
- Current Run Phase 4 End Time (indicates date and time for end of current Cleaner process phase 4)

For more information about DR Series system CLI commands, see the *Dell DR Series System Command Line Reference Guide*.

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Getting Help

For more information about what you can attempt to resolve yourself or to get technical assistance from Dell for the DR Series system, see Troubleshooting and Maintenance, Troubleshooting Error Conditions,Before Contacting Dell Support, and Contacting Dell.

Before Contacting Dell Support

If you encounter an error condition or operational issue, Dell recommends that you first attempt to see if you can resolve it using the supporting Dell DR Series system documentation before you make an attempt to contact Dell Support for technical assistance.

To help isolate or diagnose any basic issues that you may encounter with the Dell DR Series system, Dell recommends that you perform the following tasks:

- Refer to the *Dell DR Series System Administrator Guide* to verify if it contains information that can explain or resolve your issue. See Chapter 9, "Troubleshooting and Maintenance".
- Refer to the *Dell DR Series System Command Line Reference Guide* to verify if it contains information that can explain or resolve your issue.
- Read the latest set of *Dell DR Series System Release Notes* to verify if they contain any information that can explain or resolve your issue.
- Locate your Dell support account number and password, locate the Service Tag for your DR Series system, understand your type of support account, and be ready to provide specific details about the system operations you were performing.
- Record the content of any status or error dialog messages that you received, and the sequence in which they were displayed.
- Generate a current version diagnostics file (or if this is not possible, locate your latest existing diagnostics file).
  - Using the DR Series system GUI, click **Diagnostics** → **Generate** to generate a diagnostics file.
  - Using the DR Series system CLI, at the system prompt, enter the command **diagnostics --collect** to generate a diagnostics file. For more information, see the *Dell DR Series System Command Line Reference Guide*.

NOTE: For best results in addressing replication issues, you should generate diagnostics files on both DR Series source and target systems as close in time as possible.

NOTE: Each generated diagnostics file bundle contains information to assist Dell Support with the most current data about:

- System alerts and events
- System configuration status
- System log files
- System statistics for storage and replication containers
- System hardware component status

Contacting Dell

The topic explains the process for customers who need to contact Dell Support for technical assistance. For customers in the United States, please call 800-WWW-DELL (800-999-3355).

NOTE: If you do not have an active Internet connection, you can still find the proper contact information that you need on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area.

To contact Dell for sales support, technical support, or customer service issues:

1. Visit **support.dell.com**.
2. Click to select your country/region at the bottom of the **support.dell.com** page. For the full listing of countries and regions, click **All**.

   The **Choose a Country/Region** page is displayed.
3. Click the country/region from the **Americas**, **Europe, Middle East, & Africa**, or **Asia Pacific** choices.
4. Select the appropriate service or support link based on your need.
5. Select the method of contacting Dell that is most convenient for you.

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Supported Ports in a DR Series System

Table 1 lists the application and service ports found on a normally operating DR Series system. There may be other ports that are not listed here, that an administrator may need to open and enable to support specific operations across the network. Be aware that the ports listed in Table 1 may not reflect your specific network environment, or any planned deployment. While some of these DR Series system ports may not need to be accessible through the firewall, this information is made available when deploying the DR Series system in your own network because it indicates supported ports that may need to be exposed.

Table 8. Supported DR Series System Ports

Port Type	Number	Port Usage or Description
DR Series System Application Ports		
TCP	20	File Transfer Protocol (FTP)—for transferring files.
TCP	23	Telnet—remote terminal access protocol for unencrypted text communications.
TCP	80	Hypertext Transfer Protocol (HTTP)—unencrypted protocol communications.
TCP	443	HTTPS—combination of the HTTP with Secure Socket Layer (SSL)/Transport Layer Security (TLS).
TCP	1311	Hardware Health Monitor
TCP	9901	Watcher
TCP	9904	Configuration Server (needed for replication operations)
TCP	9911	Filesystem Server (needed for replication operations)
TCP	9915	MetaData Replication (needed for replication operations)
TCP	9916	Data Filesystem Server (needed for replication operations)
TCP	9918	Diagnostics Collector
TCP	9920	Data path used for OST replications
TCP	10011	Control channel (needed for OST operations)
TCP	11000	Data channel (needed for OST operations)
DR Series System Service Ports		
TCP	22	Secure Shell (SSH)—used for secure logins, file transfers like SCP (Secure Copy) and SFTP (Secure File Transfer Protocol)
TCP	25	Simple Mail Transfer Protocol (SMTP)—used for routing and sending email
TCP	139	SMB daemon—used for SMB protocol-related processes

Port Type	Number	Port Usage or Description
TCP	199	SNMP daemon—used by Simple Network Management Protocol (SNMP) requests
TCP	801	NFS status daemon